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ABSTRACT

Included in the publication are 10 articles on developing basic skills in severely and profoundly handicapped children. The first paper focuses on the development of object permanence, a basic cognitive skill, while the second and third review procedures for developing self care skills (toileting and eating). A fourth paper discusses an interdisciplinary approach to a communication system for a nonvocal severely physically handicapped student. A vision stimulation program for low functioning deaf-blind rebella children is outlined in the fifth article, while initial attention control procedures are discussed in the sixth. Topics covered in the remaining papers are techniques for developing appropriate school bus behavior, considerations in involving the autistic child in the regular school, the use of a learning center approach, and teacher education. (CL)

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Very Special Children

A Resource Series on the Severely and Multiply Handicapped

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Developing Skills in Severely and Profoundly Handicapped Children

Edited by

M. Angele Thomas

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Foreword

That severely, profoundly, and multiply handicapped children can learn is a fact that takes less convincing than it once did. This is due in no small measure to the new ways, new devices, new programs, new procedures, new techniques, and new determinations that numerous people all across the country have been using in the instructional setting. The articles in this volume, one of the *Very Special Children Series,* have been chosen because the authors are precisely that type of person. The methods and materials which they describe deserve to be tried and tested by others. Hence, the publication, if even one child is helped, will have been worthwhile.

First among the contents is "Cognitive Training of Severely and Profoundly Retarded Children." Procedures are illustrated that celerate the rate at which severly and profoundly retarded children develop object permanence, a prerequisite skill for increasing levels of cognitive functioning in other skill areas.

The second treatise, "Review of Procedures for Toilet Training the Retarded," is an evaluative review of various toilet training methods designed for institutionalized retarded persons. Another basic function, eating, is described in the third article for the teacher or parent who needs techniques in training the seriously impaired. It is entitled, "Teaching Eating Skills."

"Communication without Speech" demonstrates what can be accomplished when an occupational therapist, speech and language therapist, and special education teacher combine their efforts and ingenuity toward expressive language. "Vision Stimulation for Low Functioning Deaf-Blind Rubella Children" outlines activities and observations through which one can assess a child's visual acuity.

"Initial Instructional Strategies for the Severely Handicapped: 'Look at Me'" takes the reader through the process of gaining stimulus control and describes how to elicit simple gestural communication from a profoundly retarded child involved with cerebral palsy.

The article, "Developing Appropriate Behavior on School Buses," tells how to develop a successful system for the operant management of behavior that extends beyond the proximity of the teacher. The example given is a simple program for eliminating inappropriate behavior on school buses. The next entry, "The Autistic Child in the Regular School" is a running narrative of a teacher who used classroom assistants, volunteer helpers, and other children to provide an atmosphere conducive to an autistic child's benefiting from a program in regular school. "A Learning Center Quadrant Approach" advocates the learning center as an approach to classroom organization and management. It details procedures used to facilitate adolescent students' participation in the center as well as provide the teacher with a data system to monitor daily activities.

The last article in this volume deals with teacher education. It is entitled "Teaching the Profoundly Handicapped in the Public School Setting," and examines some of the primary instructional methods needed to effectively enhance the growth and development of the profoundly handicapped.

M. Angele Thomas
Editor

Additional Resources Available from CEC on the Severely and Profoundly Handicapped

Hey Don't Forget About Me! Education's Investment in the Severely, Profoundly, and Multiply Handicapped. Edited by M. Angele Thomas. This report from the invisible college, held January 1976, draws upon the latest information, research, and innovations shared by leaders in the field. The report deals with infant identification, the role of the parent, and early intervention. It looks at public school programs, developing curricula, and the role of the teacher and educational synthesizer. Deinstitutionalization and planned change through technical assistance and federal leadership are considered. Finally, the service of research rounds out the discussion of how the criterion of ultimate functioning can be attained. Included is a valuable resource bibliography. 1976, 208 pp. Stock number 140. $7.50.

Opening Closed Doors. David Braddock. Examines deinstitutionalization and how it can be facilitated through advocacy and positive public relations. It reviews each state's commitment to the normalization process. An extensive bibliography is included. 1977, 192 pp. Stock number 152. $7.50

Very Special Children: A Resource Series on the Severely and Multiply Handicapped.

Special Education for the Severely Handicapped: The State of the Art in 1975. Norris G. Haring. Systematic teaching methods to sequence curriculum; evaluate daily changes; select, purchase, or construct needed materials; arrange and reinforce contingencies; involve parents. 1976, 18 pp. Stock number 125. $1.95.

Assessment of Deaf-Blind Children: The Callier-Azusa Scale. Robert D. Stillman. Especially appropriate for low functioning deaf-blind children for whom other assessments are inappropriate. Evaluates motor development, perceptual development, daily living, language development, and socialization. 1976, 64 pp. Stock number 126. $3.25.

Contents

Foreword iii

Cognitive Training of Severely and Profoundly Retarded Children 1
James V. Kahn

Review of Procedures for Toilet Training the Retarded 4
Beth Duncombe
Richard Pacheco
H. Robert Quilitch

Teaching Eating Skills 7
Susan Stainback
Harriet Healy
William Stainback

Communication Without Speech 12
Eugene Wendt
Mary Jane Sprague
Jeanne Marquis

Vision Stimulation for Low Functioning Deaf-Blind Rubella Children 15
Carmella Ficociello

Initial Instructional Strategies for the Severely Handicapped: "Look at Me" 18
Robert Crego
Leonard A. Kenowitz
Eugene Edgar

Developing Appropriate Behavior on School Buses 22
Ronnie N. Alexander
Ken G. Jens
David B. Center
Elizabeth Williams Creagh
Sara Reale

The Autistic Child in the Regular School 27
Mitchel A. Miller

A Learning Center Quadrant Approach 30
Patricia T. Cegelka
William H. Berdine
Becke Cleaver

Teaching the Profoundly Handicapped in the Public School Setting 33
William Stainback
Susan Stainback

Cognitive Training of Severely and Profoundly Retarded Children

JAMES V. KAHN

James V. Kahn is the Coordinator of Mental Retardation Programs and Assistant Professor of Education at the University of Illinois at Chicago Circle. *Development of the procedures described in the article was supported in part by a University of Illinois Research Board grant.*

□ A basic tenet of Piaget's (1964) theory is that development precedes learning. By this, he means that there are cognitive structures and processes that an individual must possess before he can learn various skills. Accordingly, an individual's program of learning should be based on his level of cognitive functioning. Since many severely retarded children and most profoundly retarded individuals are functioning at Piaget's sensorimotor period, assessment procedures are needed which measure cognitive functioning during this period of development. Uzgiris and Hunt (1975) have devised such an instrument for use with infants. Kahn (1976a) recently demonstrated that this instrument can also be used reliably and validly with severely and profoundly retarded children.

Kahn (1975) demonstrated a strong relationship between the spontaneous development of speech and stage six functioning of the sensorimotor period. Kahn then hypothesized that, if a child had not yet achieved stage six, he should receive training to increase his cognitive functioning before attempts are made to train the child to speak. Other skill areas (e.g., self care skills, receptive language skills, etc.) still need further research to pinpoint the level of cognitive ability that is prerequisite for each skill. If programs are to be based on such an approach (i.e., requiring adequate cognition before training a particular skill), it is necessary to demonstrate that training children in order to increase their level of cognitive functioning is feasible. Kahn, (1976b) has made just such an attempt. He found that receiving direct training in the area of object permanence dramatically increased the performance of four severely and profoundly retarded children on the Uzgiris and Hunt scale. More importantly, he demonstrated generalization of this improvement to the other scales of the Uzgiris and Hunt instrument.

The present article describes the series of training procedures which have been developed to accelerate the rate at which severely and profoundly retarded children develop object permanence. Kahn's (1976b) findings indicate that this training will generalize to acceleration in other areas of sensorimotor intelligence (e.g., imitation, spatial relations, etc.). These procedures are still experimental and should, therefore, be used cautiously. The purpose of disseminating them at this time is to allow for their use in other experimental programs and, thereby, allow for the replication of Kahn's (1976b) findings.

TRAINING PROCEDURES

The procedures were designed to be used with children who have the use of their vision and who have no physical disability which would prevent them from reaching and grasping. Adaptations are necessary if these conditions are not met. There are 15 steps in the training program which follows the Uzgiris and Hunt (1975) scale for object permanence. Each child should enter this program at his own level which can be assessed by using the Uzgiris and Hunt scale of object permanence. The child should then be brought through each successive step in the order in which they are presented here. This is because these steps are naturally developed in this order by both nonretarded infants and severely and profoundly retarded children (Kahn, 1976a).

The object(s) used for these procedures must be wanted by the child. We found that it was sometimes necessary with certain children to use food (e.g., cookies) as the object. At other times and with other children rewarding the child with food and praise, when he was successful, sufficed. However, it must be emphasized that, for both assessment and training procedures, the child must want to follow and find the object that the tester or trainer is using.

The child may be placed on the floor or seated at a table, whichever seems most comfortable for the child. Once the assessment is completed, the training may commence at the appropriate step in the program. The criterion for achieving a step is successful performance of the task during three successive training sessions. Each session should be about 20 minutes. The procedures are as follows:

1. The child cannot follow an object smoothly through a 180° arc: Use objects that also have a sound (e.g., a music box); let the child hold the object as it is moved; help the child turn his head smoothly. These suggestions may be used singly or in combination.

2. The child loses interest in an object when it disappears: Move the object to the place from which it will disappear from view but leave it in full view of the child. On successive trials, gradually leave less of the object in view of the child. At each step, the child's eyes should linger where the object partially disappeared. Finally, through successive approximation, the entire object should disappear and the child's eyes should linger at the point where it disappeared. If at any time during this process the child's eyes do not linger at the point of partial or total disappearance, go back to the previous step.

3. The child does not obtain a partially hidden object: The same procedure should be followed as in step 2 except that the

child should obtain the object on each trial and the procedure should only continue until the object is half hidden. In addition, the object used should be made as large and bulky as possible. If at any given time in this process the child does not obtain the object, he should be prompted and helped to find the object.

4. The child's glance does not go to the point of reappearance after several trials (3 or 4) during which an object disappears from view and then reappears at another place: Try using an object that has a sound associated with it (e.g., a music box or a bell) and make noise with the object as it reappears. Repeat this several times (3 or 4). Gradually fade out the amount of sound produced by the object until the child's attention is focused at the place of reappearance without any sound being produced. In some cases, it might be necessary in beginning this procedure to prompt the child's head and help him move it into the correct direction.

5. The child does not obtain a completely hidden object: Begin with the object half covered and slowly, step by step, cover more of the object having the child find it at each successive step. When the object is finally completely hidden from view, the object should be placed under the cover, appearing as a large lump. This lump should also gradually be diminished. As necessary, the child should be prompted and helped to find the object. Using an object which produces a sound (e.g., a music box) can also be helpful for the child to initially find the completely hidden object.

6. The child does not always search under the correct cover when an object is alternately hidden under each of two covers: The same procedure can be followed here as in step 5. However, if the child searches under the second cover when he is wrong at first, he should be allowed to just practice this for a considerable period of time (4 or 5 sessions). This will allow his cognitive structures to accommodate and incorporate this new information. If this does not work, go back to the procedure in step 5.

7. The child does not always search under the correct cover when an object is randomly hidden under each of three covers: The same procedure should be followed here with three covers as was used in step 6 with two covers.

8. The child does not find an object when hidden under three screens which are arranged in a way that requires their being removed one at a time: An object should be used which has a sound associated with it (e.g., a music box). The sound should be faded out gradually on successive trials. It might also be necessary to prompt and help the child remove the second and/or third cover.

9. The child does not find the object when it is placed in a box and then the box is emptied under the cover (invisible displacement): The box should be left under the cover with the object in it for the child to find. Then the child should be permitted to watch the box being emptied and the object remaining under the cover when the box is removed. This is done by keeping the cover raised on the child's side. Then lower the cover and have the child find the object. This procedure should be repeated several times (4 or 5). Then the task should be attempted with no aids. If the child still cannot find the object, repeat the procedure.

10. The child does not always search under the correct cover when an object is hidden, through invisible displacement, under a second cover. This follows the preceding step where only one cover was present: The same procedure should be followed here as in step 9. However, if the child searches under the second cover when he is wrong at first, he should be allowed to just practice this for a considerable period of time (4 or 5 sessions). This will allow his cognitive structures to accommodate and incorporate the new information. If this does not work, go back to the procedure in step 9.

If a child cannot follow an object through a 180° arc, he can be manually helped to turn his head smoothly.

11. The child does not always search under the correct cover when an object is alternately hidden, through invisible displacement, under each of two covers: The same procedure should be followed here as in step 10.

12. The child does not always search under the correct cover when an object is alternately hidden, through invisible displacement, under each of three covers: The same procedure should be followed here as in step 10.

13. The child does not search under each cover in the same order as the examiner's hand followed when the object is hidden in the examiner's hand and he moves it beneath each of three covers leaving it under the third cover: The ob-

A visual, tactile, or auditory cue can prompt the child to move his head in the correct direction.

ject should be left under the first cover with the trainer going no further. Then the object should be moved under the first cover and left under the second cover with the trainer going no further. The child should be prompted and aided in his search. Then the object should be moved under the first and second cover and left under the third cover. Again the child should be prompted and aided in his search. This procedure should be followed in both directions (i.e., left to right and right to left).

14. The child does not search directly under the last screen after finding it there on several (4 or 5) previous trials using the preceding task. The child should be allowed to practice for a considerable period of time (4 or 5 sessions). If this is not successful, the same procedure should be followed here as in step 5.

15. The child does not follow the reverse order (last cover, middle cover, first cover) of the examiner's hand when the object is hidden under the first cover and the examiner's hand continues under the middle and last covers. This follows the child successfully going directly to the last cover on at least three previous trials: If the child is still unsuccessful after 4 or 5 trials, the same procedure should be followed here as in step 5.

CONCLUSIONS

As stated earlier, the preceding training procedures are still experimental. Each of the procedures, except for the first and second steps, has been used successfully with at least three children. In several cases considerable repetition of a procedure was necessary. This is understandable since children accommodate their internal cognitive structures only after a considerable amount of environmental evidence is presented. The interaction of the child with his environment is necessary for this accommodation to occur. During the sensorimotor period this interaction must involve a physical interaction. During later periods of cognitive development, this interaction becomes less tied to the motoric schemes until, at the formal thought level, the interaction can be through pure thought with no motor involvement.

More work is needed to refine and expand these procedures. However, they should prove useful in their present form to the benefit of severely and profoundly retarded children. In addition, disseminating these procedures at this time should help speed the process of refining them. These procedures should be adapted freely to best be used with each child. Finally, it is emphasized that the procedures given here are experimental and should be used with caution and flexibility.

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Review of Procedures for Toilet Training the Retarded

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□ It is estimated that there are over 255,000 institutionalized retarded persons in the United States (DHEW, 1972). Many are incontinent and require extra staff time in caring for them (Azrin & Foxx, 1971; Giles & Wolf, 1966). Many hours of staff time are occupied by unpleasant cleaning chores, time which could ideally be spent leading activities with these residents.

Community placement is a primary goal for the process of normalization with institutionalized retarded persons. Any community placement, however, generally requires that the person placed be toilet trained. It is probably unrealistic to expect community persons to possess the skills necessary to carry out this training.

An ideal toilet training program would consist of specific procedures, easily taught to paraprofessional teachers, which would teach daytime and nighttime toileting in a matter of days using inexpensive equipment. Such procedures *must* be initially verified with experimental studies presenting reliable data on current and long term effectiveness (Pawlicki, 1970).

Although there have been numerous published discussions of toilet training, many present no clearly specified training procedures (Bensberg, Colwell, & Cassel, 1965; Colwell, Richards, McCarver, & Ellis, 1973; Lovibond, 1964; Peterson, Wright, & Hanlon, 1969; Spock, 1968; Terdal & Buell, 1969).

HABIT TRAINING

Students within institutions are often seated on a toilet for extended periods at regular intervals each day. It is generally expected that this method will teach them to void only on the toilet at predictable times. Although they may eliminate while on the toilet, they would not be expected to initiate their own toileting. This method, commonly called *habit training*, was described by several authors as an important toilet training technique (Baumeister & Klosowski, 1965; Ellis, 1963; Hundziak, Maurer, & Watson, 1965; Kimbrell, Luckey, Barbuto, & Love, 1967; Pumroy & Pumroy, 1965). Dayan (1964), for example, placed students on the toilet every two hours. Rewards were given if they voided while on the toilet. Improvement was measured by the amount of soiled laundry taken out each week. Between April and November the laundry dropped from 1200 to 600 pounds per week.

This method would not be recommended for general use since habit training usually required from five to seven months to complete. Even though the student voided whenever placed on the toilet, staff were required indefinitely to take residents to and from the toilet several times daily. Rentfrow and Rentfrow (1969) in a review found that many studies reported a rapid loss of training when the students were habit trained in an area new to them and later returned to their ward. Furthermore, they found little objective evaluation and followup measures of effectiveness.

REWARDS AND PUNISHMENT

Punishment has been used as a procedure to control night wetting. Tough, Hawkins, McArthur, and Ravenswaay (1971) consequated night wetting with a cold bath. A urine sensing bell (Mowrer & Mowrer, 1938) was connected to the child's bed in order to wake the parents so that the child could be given a cold bath when he wet the bed. This method was successful with only one of the two children treated.

Another method utilized contingent rewards to train many toileting related behaviors such as approaching the toilet and lowering pants, which typically precede voiding, before teaching appropriate voiding (Mahoney, Van Wagenen, & Meyerson, 1971). Seven of eight normal and retarded children were initially taught to engage in these pretoileting behaviors at the sound of a tone emitted by an apparatus costing $170. They were then taught to void in a toilet at the sound of the same tone. While effective, the authors did not strongly recommend this method because of the inordinate amount of staff waiting time required by the children's infrequent voiding, a problem later remedied by a procedure developed by Azrin and Foxx (1971).

Watson (1968) used an elaborate $1500 automated toilet which reinforced voiding and defecation. Five of the eight retarded children were appropriately using the special toilet daily at the end of eight weeks of training. Most institutions could not afford this apparatus. Furthermore, it could be anticipated that persons taught to use this special toilet would require further generalization training to prepare them to use ordinary toilets.

Other reinforcement procedures were developed for a boy with an atypical lack of sphincter muscle control. Kohlenberg (1973) described a liquid filled balloon inserted into the rectum of a 13 year old encopretic boy. The balloon was attached to a water pressure column visible to the boy. A nickle was given to him for every time he squeezed the balloon and elevated the

water level for a 10 second interval. This procedure required that two people be with the boy at all times — a nurse to insert the rectal balloon and the author to operate the recording and timing apparatus. One month after the completion of training, the boy's parents reported that he did not soil for eight hour periods, whereas he had soiled continually prior to treatment. This procedure, although successful, would not be practical for widespread institutional use because of excessive staff time required. Furthermore, this boy's soiling was probably not representative of the incontinence prevalent in most institutions.

Several authors developed successful combinations of reward and punishment procedures (Gelber & Meyer, 1965; Marshall, 1966; Nordquist, 1971; Wagner & Paul, 1970). Giles and Wolf (1966) used rewards such as food, a ride in a wheelchair, a shower, or a ball for five students over an eight week training period combined with punishments such as ignoring, terminating meals, tying to the end of a 10 foot rope, or the use of restraining jackets. The rewards and punishments were uniquely designed for each child. After 60 days of training all would appropriately pull down their pants and void in a toilet, but there were no followup data presented.

SIGNALING DEVICES

Some of the most impressive results were obtained by combinations of signaling that incontinence had occurred, positive reinforcement for appropriate toileting, and simultaneous use of practice and overcorrection procedures for accidents. A urine sensing device was used to alert the teacher that an accident had occurred (Azrin, Bugle, & O'Brien, 1971; Herreshoff, 1973; Van Wagenen, Meyerson, Kerr, & Mahoney, 1969; Van Wagenen & Murdock, 1966) so that the teacher could take appropriate action to terminate the accident. (Madsen, Hoffman, Thomas, Koropsak, and Madsen, 1969, also found this device useful in toilet training normal children.)

The procedures used by one method (Van Wagenen, Meyerson, Kerr, & Mahoney, 1969) recommended that the teacher, upon detecting an accident, terminate it by yelling "Stop" and leading the resident to the toilet to complete voiding. Verbal approval was given by the teacher when the child eliminated in the toilet. At the end of the six days of teaching, all nine profoundly retarded students could walk into the bathroom, pull down their pants, and void without prompts. This toileting behavior was maintained for at least one month following training. The advantage of this procedure was its use of a signal device which provided the immediate detection of urination and an immediate response by the teacher. Furthermore, an entire toileting procedure was taught so that once the toileting behavior sequence was learned, the teacher was freed from total supervision of the students.

Azrin and Foxx (1971) modified the above procedure in order to reduce teaching time to a median of four days per student and provide for subsequent maintenance of this training. In addition, they emphasized administrative involvement and complete staff participation in the teaching. Their teaching goal was *self initiated toileting* so that at the end of the program a student would approach the toilet and complete the toilet sequence without prompts. A urine sensing device (Azrin, Bugle, & O'Brien, 1971) was used so that the teacher could respond to an inappropriate voiding immediately. The frequency of urination was increased by having students drink large quantities of fluids. The method also taught other acts associated with toileting, such as dressing, undressing, and approaching and flushing the toilet. After the student was toilet trained, he was continued on a posttraining maintenance procedure which rewarded those who had self initiated toileting for dry pants on an infrequent schedule. Cleanup practice was continued for any accidents and records were kept to determine frequency of incontinence. It was not shown that successful daytime training produced nighttime continence. Continence was achieved for all nine students involved, even those with IQ's as low as 7, and appropriate experimental verification was provided. Followup data indicated that students remained continent up to five months after the maintenance program was discontinued. Teaching procedures were well specified and they could probably be taught and administered by paraprofessionals with a relatively short period of teaching. The authors anecdotally report that this method was used to toilet train over 1000 retarded and nonretarded persons in over 50 different institutions (Foxx & Azrin, 1973). This method has been adapted to treat enuresis in retarded children (Azrin, Sneed, & Foxx, 1973) and to toilet train normal young children (Azrin & Foxx, 1973).

Numerous demonstrations have clearly shown that it is possible to toilet train the institutionalized mentally retarded using a variety of procedures. It appears that one method (Foxx & Azrin, 1973) has been developed which describes a set of these procedures most clearly. Nonetheless, it would be premature to conclude that sufficient applied research has been carried out in this area. The equipment recommended by these and other authors is still relatively expensive and has not been proved to be reliable or durable. General training procedures have been worked out, but it remains to be shown that they may be easily taught to mental health personnel working in the numerous institutions for the mentally retarded found in this country. Followup data extending years after the completion of training which specify the conditions necessary to maintain successful toilet training are still required to make a convincing argument for the adoption of one method over another. Hopefully, this problem will be solved, allowing for the community placement and maintenance of many more mentally retarded persons.

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Teaching Eating Skills

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☐ The ability to take food by mouth, a behavior typically present at birth in most infants, is a major issue to consider when teaching some severely or profoundly handicapped children. Although the involvement of public school teachers with such handicapped children has been limited in the past, the new educational philosophy of "zero reject," in regard to teaching *all* children in the public school setting, makes the knowledge of how to teach basic eating skills invaluable. Knowledge of how to teach eating skills to the seriously handicapped is imperative not only because the children generally take one or more meals during school hours, but more importantly because teaching eating skills should be a major curricular consideration for some children.

Without training and practice in taking food orally, passive feeding methods may constitute the only viable means for keeping some of these children alive. Gavage, gastrostomy, or intravenous feeding may be used to get nutrients into the child; however, such techniques do not foster independent functioning. According to Bensburg (1965):

1. Gavage is the passage of a tube through the nose or mouth into the stomach for feeding.
2. Gastrostomy is the surgical construction of a permanent opening from the external surface of the body into the stomach, for inserting a feeding tube.
3. Intravenous feeding is the insertion of a tube into a large vein in order to introduce specially refined sterile solutions of carbohydrates, fats, and proteins into the body.

The extremity of these measures, even if for only a very few children, adds impetus to the need for teachers to learn how to most effectively teach children to take food in a more "normal" way. While most severely and profoundly handicapped children do not require feeding measures such as gavage feeding, many do need to learn very basic skills such as swallowing and chewing if they are to progress beyond simply taking liquids or semisolid foods.

Although information on teaching self eating is available in the educational literature (e.g., Azrin & Armstrong, 1973; Lemke & Mitchell, 1972), little is mentioned regarding areas such as sucking, swallowing, chewing, and proper positioning. The present article examines several major aspects of beginning eating and provides simple techniques that can be used to foster some very basic skills for independent eating. Included here are the areas of (a) proper positions, (b) sucking, (c) swallowing, (d) chewing, (e) spoon and cup use, and (f) additional considerations.

The techniques suggested in this article are not intended to outline a comprehensive program nor do they negate the necessity for having a thorough understanding of human growth and development. Each child will present unique characteristics requiring careful assessment of entering level and choice of appropriate techniques. What is effective for one child may be counterproductive and/or contraindicated for another. Consult an occupational therapist or other medical resource person before beginning, if possible.

POSITIONING FOR TEACHING EATING SKILLS

The position in which a dependent handicapped child is placed during feeding time is an important variable in teaching eating skills. If the child's position is unstable or inappropriate for a particular activity, the child's attention may be distracted by his position so that full attention cannot be given to eating. In addition some positions may hamper acquisition of the development of muscular control necessary for sucking, swallowing, and chewing. The following constitute several points requiring consideration when positioning a child for feeding.

1. Normalize the feeding setting when possible. Base decisions about lap or chair feeding on the child's age and the amount and type of support needed. For example, it is inappropriate to feed a five year old from the lap if the child can be fed from an adapted or regular chair or wheelchair.
2. When lap feeding, the teacher should consider the following: (a) If a child is learning to swallow in a semireclining position on the teacher's lap, an effective approach is to have the legs crossed in tailor fashion, arms folded in front of him, and head flexed forward and supported in midline. Do not feed with head tilted back since aspiration of food or fluid into the lungs is dangerous to the child's health. With the flexion and support of such a position, the chances of proper swallowing are enhanced. (b) For the child with a tendency to go into extensor thrust, sit him sideways on your lap with the leg under the buttocks lower than the legs under the knees. This provides the child with good flexion at the knees and hips so hyperextension is less likely to occur. (c) Do not support the child with your hand on the back of his head. This will cause him to push his head back which results in a position difficult for swallowing. It may also cause the child to go into hyperextension. If head support is required, provide it with you hand at neck level. (d) Do not let the child sit with his back rounded. In such a position swallowing is nearly impossible. In order to swallow, the child is forced to lift the chin upward and head back, and thus swallowing is strained. (e) If the child is being fed in a semireclining (or reclining) position, gradually get the child more upright. Work toward having knees and hips at right angles. The child should be fed in a chair as soon as some degree of

head and neck control is achieved. The longer a child is fed in an adult's lap the more difficult it is to break the habit.

3. When the child is seated in an adapted or regular chair or wheelchair: (a) Tilt the child's head slightly downward with the neck flexed. Such a position makes it easier for the child to swallow. This position also aids the feeder in exerting manual jaw control (see Swallowing #12) if it is needed. Another advantage of neck flexion is that it makes it difficult for the child to go into hyperextension if this is a potential problem. (b) When sitting upright, the child's legs should be kept slightly apart. This should be done to facilitate muscle relaxation, eliminate possible scissoring, and promote balance. (c) Place the child so he is sitting in front of the food. In this way the child can see the food without turning his head or body. This enables the child to follow the path of the spoon without unnecessary movements. (d) Feed directly in front of the child on the same or lower visual plane. When the feeder is directly in front of the child the social interaction of eye contact can be carried on. In addition, the visual plane being the same or lower will restrict the tendency of the child to look up and push the head back, straining the swallowing process and facilitating hyperextension. (When teaching the child self eating skills such as holding a spoon, bringing the spoon to the mouth and scooping for example, as opposed to very basic skills such as sucking, swallowing, chewing, etcetera, it would be more appropriate to teach from a seated position behind the child. In this way a more natural transition from assisted to nonassisted self eating can be accomplished.)

4. Finally, be sure the child's entire body is adequately supported and the child feels stable. If the child feels unstable, he may become tense, exhibit involuntary movements, and be unable to focus his attention on the eating process. A combination of body, head, and jaw control facilitated by proper positioning can improve the functions of sucking, swallowing, and chewing.

SUCKING

Sucking is the most basic or primitive means of drawing nutrients into the body. The ability to suck is generally present at birth and considered to be an instinctive reflex; however, in some handicapped children, sucking is not present or very well developed. It should be noted that the basic sucking referred to here involves that done through a nipple. Straw sucking,

Tilting the child's head slightly with the neck flexed makes it easier for the child to swallow.

which is a slightly more advanced ability that comes later in the developmental sequence, is also discussed. The following points provide some suggestions for helping the child who has difficulty sucking (both the basic and advanced types).

1. The best time to teach sucking is when the child is thirsty. Early in the morning and after waking up from a nap are generally good times to initiate this activity. This promotes the appropriate use of the motivational element.

2. Use pleasant tasting and varied substances. With pleasant tasting liquids the child will associate good things coming from his sucking efforts. Also, by varying the substances used, the child will not be given the chance of satiating on one thing. Highly acidic liquids are not recommended for use when initially teaching sucking since such liquids tend to increase the flow of saliva in the mouth, thus complicating the sucking process.

3. Sugar syrup can be put on the nipple. This will encourage the child to keep the nipple in his mouth and to suck to get the syrup taste.

4. If a child has sucking difficulties do not provide him with a cup with a spout. This may cause the child to develop abnormal sucking patterns. The lip position for closure around the spout is unnatural.

5. Do not necessarily make larger holes in the nipple for a child who has difficulty in sucking. By putting larger holes in the nipple you are allowing more liquid to flow into the child's mouth without the child putting forth any effort. The increased flow of liquid may cause choking or a "drowning effect." If you feel the child is trying and not getting the benefits and you want to see that his efforts are rewarded, use a plastic bottle that can be squeezed to force the liquid through the nipple holes. If larger holes have already been put in the nipple, a thicker formula can be used to offset the effect of the larger holes.

6. If the child has difficulty sealing his lips around the nipple, place a finger on each cheek and push them forward. This aids the child in sealing his lips around the nipple and subsequently blocks out air leaks so his sucking efforts can be more effective.

7. Stroking a child's cheek in a downward motion stimulates the sucking reflex. This can be done both before and during the feeding process.

8. A gentle movement of the nipple in an upward, downward, and sideways motion while in the child's mouth stimulates sucking.

9. A soft rubber flared nipple can be used for children who have problems seal-

ing their lips around the nipple. Other adapted nipples are available for specific problems such as cleft palates.

10. Straw sucking should not be attempted until fairly well coordinated drinking ability has been achieved. Mouth closure, refined sucking, and swallowing are required for effective straw sucking. There are two basic reasons for developing straw sucking in children. It improves lip mobility (aids in eating and speech) and it helps the child who has trouble lifting the cup to his mouth or holding it.

11. Straws should be held and sucked by the lips alone. If necessary, manual jaw control (see Swallowing #12) should be used to hold the jaws closed. This is done to stop the biting of the straw and to stimulate lip sucking.

12. A thick walled straw should be used so no air can filter through. The straw should be durable and flexible so breakage due to biting will not occur. Also, the straw should have a small inner diameter so it is easy to suck liquid up and a limited amount is provided to prevent choking the child.

13. Use a cup with a top that the straw can be inserted through. In this way the straw will be stable and the child can use both of his hands to balance himself.

14. Some children may never learn to achieve the sucking response. For such children, the presentation of liquids to the mouth by a spoon can be used. Later a cup can be substituted when the ability to seal the lips around the cup rim is achieved.

SWALLOWING

Swallowing is the reflexive movement that pushes nutrients in the mouth down through the esophagus and into the stomach. Although swallowing is considered to be an instinctive reflex action, some profoundly handicapped children must actually learn to swallow. In this section techniques for stimulating or activating the swallowing response are discussed. Activities that can improve the quality of swallowing are also included.

1. Initiate swallowing activities by using semisolid liquids (e.g., yogurt or partially chilled gelatin). This can be done whether using a cup or spoon. With such a substance the child will feel the solidness and the need to help it get down the esophagus. Yet, if the child does not swallow, the substance will not lodge in the throat and choke him. In addition, such a substance does not require chewing, which is generally a higher level skill.

2. Hold the jaws closed and in symmetry and rub the outer gums with several firm strokes. This causes the production of saliva. This saliva production and the simultaneous jaw closure stimulate swallowing.

3. Put a small amount of peanut butter or other similar pleasant tasting sticky substance on the roof of the mouth. The movement of the tongue in trying to lick the substance enhances the swallowing reflex.

4. The application of ice (icing) in a stroking motion around the mouth and especially between the upper lip and nose stimulates the flow of saliva in the mouth. This subsequently enhances swallowing. Caution should be used with this technique since there is some indication that both brushing and icing around the face and in the midline of the body may facilitate seizure activity in some children.

5. Hold the child's lips closed when food or liquid is in his mouth. If food is in the child's mouth, the child is forced to swallow if his lips are held tightly closed, since this is the only route to get rid of the food and get a breath of air. If the child has an obstruction in the nose and/or is totally a mouth breather, do not hold the mouth closed for an extended period of time because the child can suffocate. (Of course, you must be careful not to put large chunks of food in the child's mouth that are impossible for him to swallow. This technique could be dangerous and must be used with caution.)

6. Stroking the throat in an upward motion facilitates swallowing. Use several firm strokes.

7. Brushing around the mouth and cheeks stimulates swallowing. Different texture brushes and varying strokes should be applied to determine what is most effective for the particular child. Caution should be observed in using rough or stiff textured brushes because of the sensitivity of the facial skin and the possibility of facilitating seizure activity (see Swallowing #4). The use of a vibrator for this activity has been found to be effective and does not tend to have the side effect of seizure facilitation.

8. Walking back on the tongue with a tongue depressor stimulates swallowing. Also, a lollipop, popsicle, or swizzle stick can be used. This involves pushing down on the tongue at small intervals beginning at the front of the tongue and going toward the back. This should be done on the sides of the tongue first and move to midline. For children with an exaggerated bite reflex caution should be exercised.

9. In all swallowing activities it is important to remember that the mouth must be closed for the child to swallow. It is extremely difficult to swallow with the mouth open.

10. To enhance lip closure, an important aspect in swallowing, lightly stroke the lower lip several times. Also, gently pull the lower lip out and let it spring closed. This stimulates the muscles required in mouth closure.

11. Place a finger between the upper lip and nose and apply firm and continuous pressure. This should be done periodically throughout the day without interfering with the child's play. Mouth closure and spontaneous swallowing are enhanced by this activity.

12. In some cases, there is a need for manual jaw control to close the child's mouth. When doing this from behind the child, place your thumb on the child's cheek, index finger on chin, and middle finger under the chin at the root of the tongue. By exerting upward pressure with the middle finger the jaw can be closed. If jaw control is exerted from in front of the child, the thumb is placed on the chin, the index finger on the cheek, and the middle finger under the tongue. Manual jaw control is not only important to swallowing but also to sucking and chewing.

13. Proper jaw control during feeding enhances the chances of correct swallowing patterns. If the jaws are not closed when swallowing, improper patterns can develop.

14. Jaw control should always be initiated before presenting food. If food is presented first, before you arrange your hand on the child's face for jaw control, he could have already thrust the food out of his mouth, chewed improperly, or swallowed improperly.

CHEWING

Chewing is the process by which solid nutrients are broken down in the mouth into small particles so that they can be easily swallowed and digested. Chewing is essential for taking solid nutrients into the body. Generally, children begin chewing automatically or with a little prompting as more solid foods are provided. Many profoundly handicapped children, however, require systematic training to develop proper chewing. The following provides some points to consider when teaching chewing.

1. The best time to practice chewing exercises is at the beginning of a meal. In this way the child is given an immediate chance to practice, during the remainder of the meal, what he has just learned.

2. The hardest foods to learn to chew are those with mixed textures. Such substances as meat and vegetable soups or stews require the chewing of various substances (hard, soft, stringy, etc.) at the same time.

3. When beginning to use solid foods and the chewing process is in the early stages of development, use easily digestable foods. Such foods as bananas or skinless hot dogs should be used so if a large chunk is accidentally swallowed, it can be easily digested by the body.

4. To initially develop the biting action, put small pieces of food between the child's teeth (back molar area) and manually close the child's mouth. It is usually easiest to put the food in place in the child's mouth with your fingers rather than a spoon or fork. Be careful of your fingers with children who have an exaggerated bite reflex.

5. Take a thin, five or six inch, finger shaped crust of bread and put one end between the child's teeth, close the child's mouth (using manual jaw control, see Swallowing #12), and pull the other end of the bread, breaking it off. This gives the child experience in feeling himself bite and break food with his teeth.

6. Put a piece of food between the child's teeth and using jaw control, hold the jaws closed. Because of the presence of the food between the teeth, the child will naturally resist the jaw closure, and the chewing motion will result. This is an excellent exercise that should be used frequently.

7. When using manual jaw control to stimulate chewing, never use intermittent pressure on the jaws. Simply apply firm, continuous pressure on the lower jaw. Intermittent pressure results in abnormal chewing patterns.

8. If a child has difficulty chewing, use a five inch, finger sized piece of raw beef and do the following exercise before meals: Place one end of the beef between his teeth and hold onto the other end. Use manual jaw control to keep his jaws closed. Raw beef is tough enough that it cannot be broken off and slip into the child's throat. Salt or other seasoning can be sprinkled on the raw beef to make it more palatable to the child.

9. As implied above, lip closure during chewing is an important variable to consider, especially if tongue thrust is a problem. The tongue should remain in the mouth during the entire chewing sequence so that it does not force the food out of the mouth, but rather moves it around between the teeth for effective chewing.

SPOON FEEDING AND CUP DRINKING

Spoon feeding and, later, cup drinking are prerequisites for independent eating. The presentation of liquids or solids by a spoon can be employed relatively early in the eating sequence. Spoon feeding also constitutes an option for the presentation of liquids to children who cannot master the sucking act. Cup drinking generally comes later. This is so since the child must have adequate muscle coordination to seal his lips around the rim of the cup. The following includes some considerations when teaching spoon feeding and cup drinking.

1. When spoon feeding, initially present liquids and gradually move into more semisolid and solid foods. This provides a smooth transition from nipple to spoon feeding.

2. Choose a spoon that does not have a deep bowl. A child can more easily use his lips to remove food from a shallow bowled spoon. The bowl of the spoon should be short and rounded on the end. Long, pointed spoons may stimulate the gag reflex in some children.

3. Begin by presenting the spoon from the side of the mouth and gradually move toward midline since midline control is the last to develop. Generally it is more effective to eventually spoon feed midline since this enhances smooth transfer to later self feeding (it is the "normal" approach). If, however, the child has an exaggerated bite reflex or abnormal tongue movement, presenting the food from the side may be found to be more effective.

4. When the spoon is put into the child's mouth, apply firm pressure with the spoon on the middle of his tongue. This pressure stimulates spontaneous use of lips and tongue. It also eliminates tongue thrust.

5. Use a metal or bone spoon rather than a plastic one. A brittle plastic spoon may be broken if a child has a strong biting reflex. If the child has an exaggerated startle reflex or sensitive gums, a metal spoon with a rubber coating may be most effective.

6. If removal of a spoon facilitates a strong bite reflex, pressure applied under the chin around the base of the tongue can relieve the bite so the spoon can be removed.

7. Begin spoon feeding semisolid foods by placing a small amount of food on the front of the spoon. This can be more easily removed by the child than if it is in the middle of the bowl.

8. When the spoon is removed from the mouth, make sure the lips are closed. With the lips closed, the tongue can push the food around in the mouth rather than thrusting it out.

9. When removing the spoon from the child's mouth, do not scrape the upper teeth or lips. This tends to stimulate tongue thrust and also requires no action on the part of the child to get the food off of the spoon. If lip movement is poor, use finger to push lip over the spoon as it is taken from the mouth to remove the food, gradually withdrawing this help until the child learns to do this himself.

10. When food falls on the child's chin, it should be scraped in an upward motion toward the child's mouth with the spoon. This action enhances lip closure and stimulates swallowing.

11. When beginning cup drinking, be sure to place the rim of the cup on the lower lip rather than between the teeth. Placing the cup between the teeth tends to stimulate the bite reflex.

12. Lift the cup to where the liquid touches the upper lip. This requires the child to take an active part and do the rest.

13. Do not remove the cup after each swallow. Let it rest between the lips. Removal after each swallow may result in an inefficient and abnormal drinking pattern.

14. Begin cup drinking with a slightly thickened liquid. This stimulates swallowing and is less likely to spill.

15. Present the cup to the child from the lower front side. This eliminates the chance of some children going into extensor thrust by throwing the head back when watching the cup come from above. It also aids in swallowing since the neck is naturally flexed from watching the cup come from below.

16. For beginning drinking use a cup with a space cut out of the rim at the top. In this way, the child does not have to tilt his head back to get the liquid.

17. When the child learns to drink from a cup, eliminate as much jaw movement as possible. Hold the cup with one hand and apply pressure against the child's chin with the other. If such movements are not eliminated, an abnormal pattern of sucking liquid from the cup might develop.

ADDITIONAL CONSIDERATIONS

Although the specific emphasis areas in teaching feeding skills are important to discuss individually, there are some considerations that are generic to all the areas. Their importance pervades the areas of positioning, spoon feeding, and cup drinking as well as sucking, swallow-

ing and chewing. The following includes several of these considerations.

1. The feeding situation should be quiet and peaceful with no sudden movements. It should be clean, uncluttered, and pleasant for the feeder and the child. The environmental conditions may influence the child's desire to eat. A noisy, cluttered room with an unpleasant odor may distract the child and cause the food to appear unpalatable to him (as it would many adults).

2. Both the child and the feeder should be relaxed. A tense feeder will communicate his fears or anxieties to the child. Subsequently, the child may become tense and the eating process more difficult. When the muscles are tense, such processes as swallowing and digestion are more difficult.

3. An effective approach to enhance relaxation at feeding times is to only present food when the child is physically relaxed. The child will quickly learn that he must relax if he wants the food.

4. To enhance eating skills, alternately stimulate (cold compress) and relax (warm compress) the muscles involved in basic eating skills before beginning the eating sequence.

5. If a piece of food slips into the child's throat, bring the child forward into good flexion and the food will come out. Do not pat the child on the back since this causes inhalation and thus holds or pulls the food further down in the throat and may cause aspiration.

6. Do not put peanut butter on the lips or around the outside of the mouth. This often encourages the child to develop a tongue thrust.

7. Exercises to help eliminate tongue thrust include putting pressure at the root of the tongue which tends to pull the tongue back into the mouth. Another technique is to gently and carefully pull the tongue out of the mouth. The resulting counter movement is that the tongue is pulled back into the mouth. Caution should be used in pulling the tongue to avoid injuring the connective tissue.

8. Feed the child only when he is hungry. If the child is forced to eat when he is not hungry, the feeding situation may become an unpleasant time for the child that he will try to avoid rather than look forward to.

9. During the acquisition period of any feeding skill it is important that once the optimum technique has been determined the same procedure should be used regardless of the feeder.

10. For children who do not move around after eating gently pat them on the back to "burp" them so air in the stomach can be expelled. Also after the feeding procedures lay the child with the head and upper trunk lower than the rest of the body so excess food and mucus can be expelled through the mouth rather than being regurgitated and subsequently aspirated. If the child has a problem with congestion consult medical personnel (physical or occupational therapist) about the possible need for "postural drainage" and get them to teach you the technique if it is necessary and they are unavailable to do it themselves.

SUMMARY

Eating orally (e.g., sucking, swallowing, and chewing) is an activity that many individuals take for granted as a natural instinctive process. Unfortunately, in some profoundly handicapped individuals this process does not evolve naturally. It must be sequentially and systematically taught if they are to progress in the developmental sequence or if passive feeding (gavage, gastrostomy, and intravenous feeding) is not to become a lifelong reality.

As educators of the profoundly handicapped, we must develop more and better techniques to enhance oral eating skills in children. These prerequisites to self eating as well as prerequisites of other self help skills are of paramount importance if the true potential of profoundly handicapped persons is to be efficiently developed.

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Communication Without Speech

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□ In the fall of 1969, Lydell, a 10½ year old boy with cerebral palsy, was enrolled at Lapham Orthopedic School in Madison, Wisconsin. Lydell was severely physically handicapped in all four extremities. He could not walk, he had no oral speech or understandable gestures, and his hand skills were so limited that he was totally dependent on others for feeding, dressing, and ambulation. During an initial visit to the school he was pushed around the building in a baby stroller by his mother. Lydell had not previously been enrolled in any formal school educational program, although he had received homebound instruction and limited outpatient therapy. Since his family did not live in Madison, Lydell was placed with a boarding home family during the school week.

A PERIOD OF ADJUSTMENT

The first year was a difficult adjustment period. It was Lydell's first separation from his home and family and he was homesick and tearful much of the time. The school program necessarily focused first on his emotional adjustment before more extensive educational and therapeutic procedures could be implemented. He was exposed to play and work situations with other children and to the routine, structure, and stimulation of the school setting. His responses began to fluctuate from excessive outbursts of crying to periods of quiet, attentive behaviors. This period was an equally difficult and trying time for his parents. Their support and close association with their child, along with a strong and loving boarding home family, contributed greatly to Lydell's eventual adjustment.

Classroom and therapy programs during the first year could be described as ongoing diagnostic procedures. Evaluations of baseline behaviors revealed that in the classroom Lydell was able to identify numbers to 10 by pounding on an adapted desk or by squeezing the teacher's arm, and identify colors, written words, and primary reading vocabulary words by pointing with a gross motor arm movement or by vocalizing a gutteral sound. In physical therapy he needed alteration of range of motion, coordination exercises, and body positioning for best trunk and head control.

Lydell's speech therapy session would be held in conjunction with physical therapy. The therapists experimented with different body positions in an attempt to find which was most appropriate for eliciting phonation. A normal erect sitting posture with support was found to be best. A wheelchair would therefore be a future recommendation.

The factors contributing to Lydell's inability to vocalize were poor oral musculature, poor feeding patterns, and poor head control. The occupational therapy program was designed to alleviate these problems. Such techniques as Rood facilitation, desensitization, and proper positioning were initiated. In addition, the occupational therapist decided that continued motor evaluation and training were necessary to decide which arm and hand were most functional.

STEADY IMPROVEMENT

Performance levels at the end of the first school year found Lydell using a wheelchair all day; improving his head control, mouth closure, and swallowing patterns; and beginning a more structured feeding program. Motor development levels had been identified, and his receptive language age was found to be within normal limits. A satisfactory *yes* or *no* response could usually be determined from Lydell's head movement and could be checked when necessary by having him look to the far right at a *yes* card and to the far left at a *no* card. Limited phonation had been attained. Program direction for the coming year was established. Since Lydell had good receptive language, he was placed in a classroom with higher achieving children where he could absorb more as a listener. Special programing would be necessary.

In the fall of his second year at the school Lydell began an intensive academic and therapy program. The feeding program previously initiated was intensified to a daily basis. He was learning to eat all solid foods, chew and swallow independently, and suck from a straw — evidence of general improvement of oral musculature. He was able to produce sound on command, to vary and to prolong the phonation, and to say "hi." However, with a chronological age of 11 years, 6 months, the prospect of his achieving functional speech seemed remote. The speech therapist therefore decided to seek an alternative means of expressive communication.

COMMUNICATION WITHOUT SPEECH

The occupational therapist noted that Lydell's hand skills were still at such a low level that any communication device requiring hand skills was not practical at that time. Because he had achieved better

Figure 1. The Auto-Com developed by Cerebral Palsy Instrumentation Group at the University of Wisconsin, Madison. Greg Vanderheiden, Program Director.

head control, the speech therapist attempted placing a tongue depressor between Lydell's teeth and having him point to letters on a felt board directly in front of his wheelchair. Despite some awkwardness and difficulty with this communication device, Lydell demonstrated that he could learn to spell. The staff was encouraged by his enthusiasm and excitement and the speed with which he acquired a basic spelling vocabulary.

Continuing on the basis that this would be the best mode of communication, the therapists attempted to find a better mouth device for pointing. Numerous devices were tried and, with the assistance of a dentist, a more permanent mouth pointer was designed. The use of the mouth device was impractical in the classroom, but Lydell's new interest in letters and words and his improved spelling ability tended to reinforce and further develop this mode of expression.

Lydell's learning rate was developing faster than his ability to use the mouth stick to express his thoughts. His realization that he could communicate with people in a way that he had not experienced before stimulated all areas of his development, both physical and mental. He worked hard and, after several months, it became evident both in the classroom and in therapy that his left arm and hand were becoming more functional. He was able to control his arm motions in midranges, grasp a pencil or dowel to make a mark on paper, and point to a picture or printed word. He was also appropriately positioned in his own wheelchair. It became apparent that he could use the second and third digits of his left hand by sliding the fingertips to specific symbols or letters. However, he still could not use conventional writing devices or an adapted electric typewriter.

THE LETTER BOARD

The speech therapist suggested the possibility of a letter board that could be used with hand and finger spelling. The occupational therapist designed a board appropriate to Lydell's level of hand skills, which contained letter and number ar-

rangements agreed on by the classroom teacher and speech therapist.

Lydell became skilled in using the board and its use greatly changed his life. Communication became exciting and increasingly important for Lydell and he carried his board with him everywhere. He was able to express his feelings, ask questions, and interact in classroom activities. A sense of humor was fast developing as he learned and used the idioms of spoken language. As his language skill improved, his communication board was altered to contain digraphs, endings, question words, and other whole words important to him in quick communication. The staff realized, however, that the board's usefulness was limited to situations where a second party was present to interpret his message. The next step seemed to be the development of a communication device that Lydell could use more independently.

AN ENGINEERING CHALLENGE

The school psychologist contacted the Department of Electrical Engineering at the University of Wisconsin and explained Lydell's needs. Two students and a professor were interested and responded enthusiastically. They came to the school to familiarize themselves with the situation and decided it would be a challenge. A group of engineering students was organized and, together with the multidisciplinary team from Lydell's school, began painstaking trial and error procedures to develop a communication device that would be faster, more efficient, and allow for more independence. They found that the original letter board worked best and the group started looking for some way to automate it. The initial research was done at school, experimenting with Lydell's functional abilities. The students brought their own equipment.

After many months of consultation between the engineers and occupational therapist, a unit was developed in the laboratory that allowed Lydell to slide a specially devised hand unit equipped with a magnet across a letter board. When he paused at a particular letter, a switch under the letter closed and a signal was sent to an electric typewriter to type a printed symbol. As Lydell pointed to letters, he could record them on paper as his method of expressive language. The device was a fantastic breakthrough in the search to make this child more independent.

THE AUTO-COM

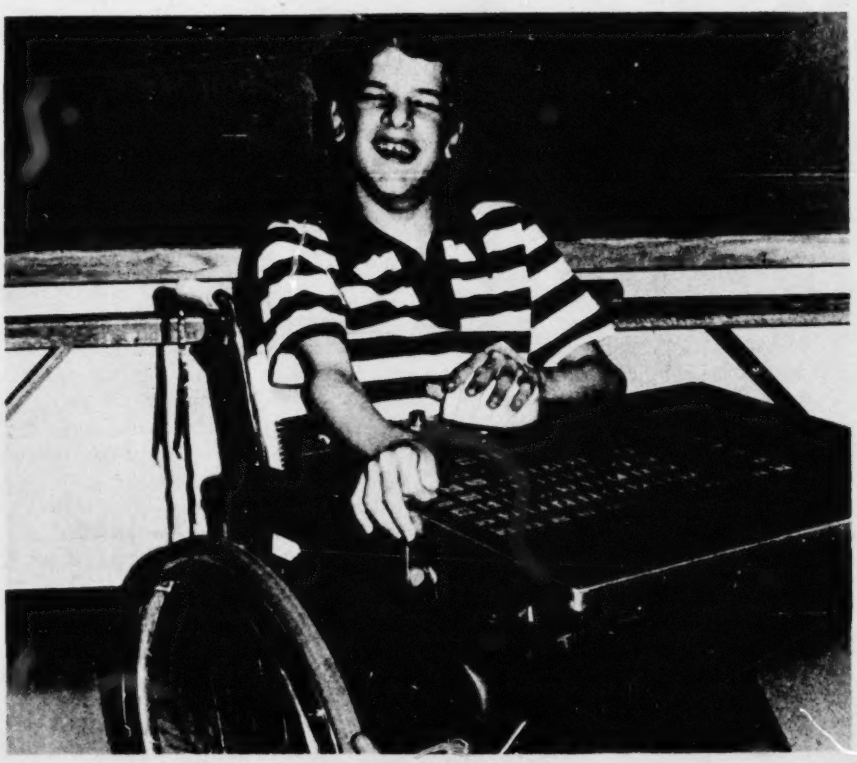
Continued research by the engineering group perfected this device and led to the development of the Auto-Com (see Figure 1). This device uses a magnetic letter board and records messages on a typewriter, a television screen, or a tape printout. The television unit is located on a table in Lydell's classroom. Once he is positioned, he can work on an assignment independently, take spelling tests with his class, or talk to friends. The Auto-Com is now portable. It can be attached to his wheelchair and used both as a lap tray and as a communication board. For quick, unrecorded personal conversation, Lydell still prefers to use the communication board manually (with his two fingers and with the machine turned off).

The Auto-Com has opened up a new area for persons who lack expressive language skills, although it cannot be used by everyone. Its effectiveness and ultimate functional use will depend on the individual's unique combination of physical and intellectual abilities in conjunction with the training and support of those involved in the habilitation process.

PROGRESS TOWARD INDEPENDENCE

The Auto-Com facilitates communication for the child who can understand the symbol system and has the motor skill to use and operate the device. Lydell's receptive language processes were intact — he needed only an expressive outlet. Therapy and educational experience were able to build on his capacity and eagerness to learn. The Auto-Com has given Lydell independence in expressive language. It has made it possible for him to compete and participate more easily in classroom group activities; it has increased his speed of acquiring a reading and writing vocabulary by providing immediate visual feedback; it has provided an additional incentive for learning; and it has increased his self image.

Lydell is still severely handicapped. He may always need a protective environment, but progress toward independence has been made. New advances in the Auto-Com enable him to print out whole words and phrases and have increased his rate of communication. He is now enrolled in a middle school (6th, 7th, and 8th grades) and spends part of his day in a special class for orthopedically handicapped and is mainstreamed part time in a regular 6th grade class. His life has been enriched by his experiences in public school education and, because of the combined efforts of many people, he can now communicate, socialize, and appreciate life more fully.



Vision Stimulation for Low Functioning Deaf-Blind Rubella Children

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□ Prior to the 1950's and 1960's, the philosophy adhered to in the education of low vision children was that of sight-saving or sight conservation. The basis for this concept was the belief by eye specialists and educators alike that if a child used his residual vision, his eyes would be further damaged and an increased loss of sight would result. Therefore, methods and materials requiring a minimal use of vision were employed in teaching these children. Often they were educated as blind children; they learned to read braille and to develop their tactile sense.

As medical research on vision indicated that the use of vision could not cause further damage to the eye and could not result in increased impairment, eye specialists began to encourage the use of, rather than the saving of, residual vision. It was also found that distance visual acuity (i.e., standard Snellen E Chart measures) did not necessarily reflect near visual acuity, and that considerable visual efficiency could be developed by teaching a child to use his near point vision (Bier, 1960).

The pioneer in the development of vision stimulation techniques and materials was Dr. Natalie Barraga. In 1962-1963, Dr. Barraga developed an experimental program for low vision children in which a positive change in the visual behavior of all the children was achieved (Barraga, 1964). In 1965, this study was repeated with similar results using many more materials, children, and teachers. This research suggested that "the use of vision in children with serious impairments in the eyes was a learned ability and could be taught" (Ashcroft, Halliday, & Barraga, 1965). Since that time, research on vision stimulation techniques and materials has steadily increased, and programs for the development of positive visual behaviors have begun both in public schools and in private institutions for the visually impaired.

EYE DEFECTS OF DEAF-BLIND RUBELLA CHILDREN

To date, little attention in the field of vision research has been focused on low functioning deaf-blind rubella children. The term *deaf-blind* in relation to these children is misleading since most of them do have some sight and hearing, but to maintain consistency with other literature these children will be referred to here as deaf-blind. The concern, however, is with those children who are not totally blind.

As a result of their mothers contracting the rubella virus (German measles) during the early months of pregnancy, these children were born with an eye defect or defects and with a hearing disability. These problems are often complicated further by congenital heart problems and psychomotor retardation (Cooper, 1967).

One common eye defect found in rubella children is rubella retinopathy, characterized by widespread pigment deposits on the retina (Roy, Hiatt, Korones, & Roanes, 1966; Krill, 1967). Cooper (1967) found these deposits to have little or no effect on acuity, adaptation to darkness, color vision, visual field, or electroretinography. However, Efron (1974) observed that rubella children respond better to certain colors (but he did not specifically state that these children had rubella retinopathy).

Another common eye problem found in deaf-blind rubella children is congenital cataracts (an opacity of the crystalline lens of the eye). These cataracts, usually bilateral, are generally surgically removed and the child wears cataract glasses or contact lenses.

Some rubella children are born with microthalmia, abnormally small eyeballs. Microthalmia can affect the total refractive status of the eye (Roy et al., 1966; O'Neill, 1967; Cooper, 1967).

An eye problem sometimes found is glaucoma, which may be congenital or secondary following an operation to remove cataracts (Roy et al., 1966; Cooper, 1967). Glaucoma is an increase in pressure within the eye because the aqueous fluid does not escape. This pressure kills retinal cells and optic nerve fibers.

These children sometimes have strabismus, a failure of both eyes to direct their gaze at the same object simultaneously (Roy et al., 1966; O'Neill, 1967). Also, nystagmus, involuntary movement of the eyeball, is often present after several months of age since fixation reflexes fail to develop due to the cataract's effect on the child's vision.

PRESENT VISION STIMULATION PROGRAMS

Despite these eye problems, most deaf-blind children do have at least some residual vision. If they are trained to use this vision, they may develop substantial visual efficiency. However, the compounding of the visual disabilities with the hearing loss and consequent language deficit, and the brain damage which causes learning problems, make it necessary to modify present visual programs to meet the needs of low functioning deaf-blind children.

The emphasis in current vision stimulation programs is on the development of visual perceptual skills as a basis for cognition and academic tasks. The child first learns to discriminate geometric forms and three dimensional objects tactually and visually, and later on a visual basis only. The child then recognizes and makes finer and finer discriminations between objects by shape, size, position, color, class, and use. He learns the concepts of same and different, spatial concepts,

To check for peripheral vision, sit behind the child and slowly move a penlight around to the front of his face. Note at what point the child turns his head in the direction of the light.

and size concepts. These programs are excellent for a large number of the low vision population, including some of the higher functioning deaf-blind children, but in planning programs for lower functioning deaf-blind children, additional factors must be considered.

First of all, since many of these children are functioning on a sensory-motor level and not a perceptual level, they barely respond to outside stimuli and do not develop perceptions of their environment. Present vision stimulation programs should be considered as future educational goals and not as starting points for these children.

Second, even if the child is functioning on a perceptual level, his additional multihandicapping problems make it difficult for him to fit into existing vision stimulation programs. Hearing loss alienates the child from his environment even further. The resulting language deficit means that the child does not have an adequate symbol system with which to record his perceptions. It also requires the teacher to use specialized methods to communicate with the child and to develop his language.

The brain damage that is often part of the rubella syndrome may cause additional learning disabilities and unusual behavior patterns such as fetish and ritualistic behaviors or tactile defensiveness. Also, a child who is receiving little sensory input accumulates internal energy and stress and often engages in self stimulating behavior in order to release this energy. In rubella children such self stimulating behavior is commonly seen in light gazing and rocking.

A low functioning deaf-blind rubella child may have any one or a combination of these problems in addition to his visual disabilities. Obviously, current vision stimulation methodology must be modified for these children. Many of the goals of these programs may not even apply to extremely low functioning children.

COMPONENTS OF A MODIFIED VISION STIMULATION PROGRAM

Individual Program Plan

Because each deaf-blind child differs in problems, abilities, and behavior, it is imperative that an individual program plan be designed to meet each child's individual needs. Such a plan includes initial evaluation and assessment of the child's levels of functioning, the development of long and short term goals for the child from which sequenced activities and materials are designed, and documentation to record the progress the child makes in reaching both the long and short term goals.

Although this discussion will primarily be concerned with activities for the development of visual efficiency, it is important in planning activities to incorporate several goals into each activity. One activity might include a visual goal, a motor goal, and a language goal. In this way, the child is given an integrated program and does not simply develop splinter skills. The materials used should be objects found in the child's day to day surroundings so that he gains experience with these objects and develops an awareness and understanding of the environment.

Assessment and Initial Evaluation

An ophthalmological report should be obtained on the child which will provide information about eye impairments, distance vision, etiology, and any prescriptive measures. Since scales such as the *Visual Efficiency Scale* (Barraga, 1967) are too advanced for many of these children, the teacher may design various activities to obtain at least an informal assessment of the child's near vision acuity and visual efficiency.

Included here should be activities to assess the child's perception of and ability to attend to light. This may be done by flashing a penlight or small flashlight about 12 inches (or closer if necessary) from the child's eyes and recording whether he responds by looking at the light, how long he attends to the light, and if he reaches for it (eye-hand coordination). The light should also be flashed slightly above, below, to the left, and to the right of the child's face to ascertain peripheral (left-right) vision and the vision in the upper and lower parts of the eye.

This activity can be modified to check the child's color vision and ability to track moving objects. If the child responds by attending or reaching when pieces of different colored plastic are used to cover the light (or when the plastic is shown by itself), it can be assumed that the child is able to see these colors. Some children may even show a preference to a certain color, which can then be used in materials to stimulate vision.

Ability to track moving objects can be assessed by slowly moving the light back and forth and up and down in front of the child's eyes and recording if he responds by moving either his eyes or his head to follow the light. Other objects effective when measuring the ability to track are balloons, children's bubbles, and candy on a string. These objects are moved in front of the child's face and the response is recorded.

The child's ability to scan visually can be assessed by placing two or three objects in front of him, particularly familiar ob-

jects or ones that the child likes, and recording his ability to shift attention from one object to another.

To check for eye-hand coordination and figure-ground discrimination, an effective activity is to place several objects of different sizes and colors on the floor and have the child pick them up. These objects should be of contrasting colors so that they can be easily seen. Candy and other food are particularly good for this activity. Evaluate what size they must be for the child to see them, and how close he must be to the objects before he sees them.

Other activities to check for eye-hand coordination involve giving the child different objects, one at a time, to play with for a short time. The teacher then takes the object, holds it in front of the child, and records if he reaches for it. To check for eye-foot coordination, place several pieces of bright colored paper on the floor as a path and have the child walk from one paper to the next.

Activities should also be included which assess perceptual skills such as the ability to match identical objects, objects of similar shape, similar size, and similar color. Activities involving matching objects to pictures of the objects and picture to picture should also be used.

All of these materials and methods are suggestions which can be modified and expanded for the individual child.

It is essential that the teacher record the child's responses in each of the assessment activities, as well as other observations made while presenting the activities to the child. Record keeping might include observations of the following:

1. General condition of the eyes.
   - Are they infected?
   - Do they constrict when light is presented?
   - Is there considerable nystagmus?
2. Use of the eyes.
   - Does the child use one eye more than the other?
   - Does the child use both eyes simultaneously?
3. Body movements.
   - Does the child move his head to see more clearly from a particular part of the eye?
   - Does the child adjust his body to aid in focusing?
4. Tactile skills.
   - Does the child depend on tactile information to discern the nature of objects?
5. Distance and size.
   - Is there an optimum distance at which the child can see objects?
   - Is there an optimum size for objects to be seen?
6. Response to color.
   - Does the child respond to all or only some colors?

The Stimulation Program

When the initial evaluation is complete, the teacher uses this information to develop long and short term goals, activities, materials, and methods of collecting formative and summative data on each child. Many of the same activities used in the initial evaluation can be used and elaborated on to develop these skills. It is important to use several different methods and materials since different children will be stimulated by different things.

The following outline is an example of the stimulation program.

I. Visual skills
   A. Attention (to light and objects)
   B. Localization
   C. Tracking
   D. Scanning
   E. Figure-ground discrimination
II. Motor skills involving vision
   A. Body movement: running, jumping, hopping, crossing the midline.
   B. Eye-hand coordination
      1. Gross motor: previous suggestions plus ball and bean bag activities such as throwing, catching, bouncing, hitting targets
      2. Fine motor: cutting, pasting, painting, coloring
   C. Eye-foot coordination: previous suggestions plus walking forward, sideward, backward on a line; jumping over objects; kicking a ball
III. Visual skills and mobility: in the classroom, building, outside, home
IV. Body image: identification of body parts, laterality, co-active movement
V. Visual perception
   A. Discrimination of objects, shapes, sizes, colors, and pictures
   B. Sorting and classification
   C. Sequencing
VI. Vision and other areas of the child's program

The child should be encouraged to use his vision in performing other activities. For example, if the child is learning to feed himself, encourage him to use his vision in finding the spoon or food on the plate. If he is learning to dress himself, encourage him to use his vision to find his clothes and to put them on.

Documentation

A system of collecting formative and summative evaluation data should be incorporated into the teaching program. This documentation may be in the form of developmental scales, behavioral charts, anecdotal records, videotaping, or other systematic approach to data collection. The method of documentation used is up to the discretion of the teacher; the important thing is to have some system of recording the child's progress.

NEED FOR FURTHER RESEARCH

Vision stimulation, particularly vision stimulation for low functioning deaf-blind rubella children, is a new area. Research must be conducted by those who are teaching low functioning deaf-blind rubella children. Methods and materials should be developed to assist these children in learning to use their residual vision, regardless of their level of functioning or degree of visual loss.

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Initial Instructional Strategies for the Severely Handicapped: "Look at Me"

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As the public schools assume the responsibility of educating the severely/profoundly handicapped, teachers are faced with novel instructional problems. In many cases the traditional subject areas of reading, arithmetic, and writing are not appropriate for these children and teachers find themselves attempting to teach more basic developmental skills, such as beginning communication skills, basic gross motor behaviors, and primitive responses to stimuli. Since traditional teacher training programs (including special education training) seldom deal with instructional procedures for such low level behaviors, many teachers have turned to developmental checklists as their basic curriculum guide. Teachers observe individual student behavior and determine what developmental skill should be taught by following the sequence of normal behavioral development. In many cases, this technique is most appropriate for the severely handicapped. However, with some children, especially low response children (children who have few, if any, behavioral responses), additional instructional procedures are necessary *before* basic developmental behaviors can be taught.

Before instructional procedures can be developed for low response children, the children must be brought under stimulus control. That is, at least one behavior must be under the control of the teacher. Once one behavior is under teacher control, instruction can proceed. However, if instruction is attempted on developmental tasks before stimulus control is established, procedures such as physical prompting, modeling, and chaining will seldom be effective. The advantages of establishing basic stimulus control include: (a) a basic beginning point for all future instruction; (b) the empirical determination of a child specific reinforcer; and (c) the beginning of an instructional sequence for imitation training. This report concerns the basic procedures used to bring one child, Fred, under basic stimulus control.

FRED

Fred is a 13 year old severely involved cerebral palsied child with profound mental retardation. Both of his feet are severely deformed and are nonfunctional. Fred has severe skeletal deformities associated with his neuromuscular problem as well as a cronically dislocated left hip that may have developed from birth. All of his extremities have a limited range of motion due to the severe contractures that have developed.

Fred's growth pattern is markedly delayed. He is in the 50th percentile in height for an 8 year old, 50th percentile in weight for a 3 year old, and the 50th percentile in head circumference for a 5 year old.

Fred had received no educational pro-

Fred, a 13 year old severely involved cerebral palsied child with profound mental retardation, mastered the three phases of the "look at me" program.

graming before coming to the Experimental Education Unit when he was 12 years old. Initial assessment with the Uniform Performance Assessment System revealed a very limited behavioral repertoire. He has virtually no self help skills. In fact, feeding, dressing, and general hygiene are a major problem in caring for Fred. In the gross motor area Fred shows a limited ability to turn his head slightly when in a supine position. In the area of communications (expressive and receptive) he has few observable behaviors. He does laugh aloud, but this is often not in an appropriate situation. He does startle to a loud sound and will turn his eyes and head toward verbalizations and sounds in his immediate environment. Fred can also track in a 180 degree arc when his head is stabilized. He can focus on objects but shows little consistency when required to do so in a structured program.

"Fred, look at me."

THE BASIC STRATEGY

Before instruction could begin, procedures had to be instigated to establish basic control over Fred. Since Fred did not consistently perform any one specific behavior on demand, three basic responses were selected for training as prerequisite for all future instruction. First, on command, Fred would look at (make eye contact with) the teacher. Second, on command, Fred would look at (make eye contact with) an object. Finally, on command, Fred would touch the object. These three observable behaviors became the instructional objectives for Fred. The same basic instructional procedures were used to elicit each of these behaviors. The command was given, "Fred, look at me." A 5 second latency of response was tolerated. When Fred correctly emitted the behavior within 5 seconds of the command, he was reinforced. If Fred did not make the correct response within 5 seconds, he was physically prompted until the correct response was made and then reinforced. Thus, each trial resulted in Fred receiving reinforcement, either after a correct, self initiated response or a physically prompted response. Once these three behaviors were under stimulus control of the instructor, basic developmental behaviors could be taught.

INITIAL PROGRAM ASSESSMENT

In order to assess whether or not Fred would perform the activities of the "look at me" program, baseline data were gathered for three days. The teacher gathered information relative to Fred's eye tracking abilities, random eye movements, free hand movements, and eye focusing behavior. Fred had good bilateral eye movement, did attend to specific stimuli in the classroom environment, and his left hand moved more fluidly and at a much higher rate than his right hand. Therefore, from the three days of initial assessment the teacher concluded that Fred could indeed begin the "look at me" educational program.

CHOOSING A REINFORCER

The next step in the program was to determine what would reinforce Fred to perform the activities of the "look at me" program. A number of options were discussed prior to experimenting with various reinforcers. A pediatrician who was consulted warned that any excessive visual or auditory reinforcer might precipitate seizures, thereby endangering Fred and confounding the experimental results. Fred's much too fragile body structure ruled out the the use of a vibrator. Food was discussed, but a history of working with the patient showed that food was not reinforcing to him and it would take too long to feed him to make the reinforcer meaningful. A verbal reinforcer accompanied by light rubbing of Fred's chest was selected.

During the three initial program assessment days, the combination of verbal reinforcement and soft stroking was explored. The teacher concluded through observing the reaction of Fred to various types of verbal reinforcement that the social reinforcer should be a loud "Hooray for Fred" in combination with a mild stroking of the chest. It was also determined that when reinforcing Fred the teacher would be as close as possible for maximum reinforcement results.

PHASE 1:

LOOK AT ME

Fred was seated in his wheelchair and the teacher, in order to be as close to Fred as possible, was seated on a low table with his legs placed on either side of the wheelchair. The teacher said, "Fred, look at me." If Fred's eyes met the teacher's he was reinforced simultaneously with a loud "Hooray for Fred" and a mild stroking of the chest. If his eyes did not meet the teacher's, the teacher turned Fred's head until eye contact was made and then the reinforcer was applied. In both cases, Fred was allowed approximately 3 to 5 seconds to respond and only 1 command per trial was given. Two sets of 10 trials were performed, each set of 10 trials lasted approximately 7 minutes with a 3 minute break between the 2 sets of trials. The distance between the teacher's face and Fred was gradually increased as profi-

"Fred, look."

ciency at correct responses increased. Correct and incorrect responses were recorded.

It is important that all phases of this program occur in a distraction free environment in order to maximize the student's attention to the teacher. The teacher should place his face as close as possible to the student and reinforce any eye contact immediately. Also the teacher should play for about 5 minutes with the student as a warmup period.

PHASE 2:

LOOK AT THE BALL

A bright orange rubber ball with about 10 nodular protrusions was used as the object for the second phase of the program. Fred, seated in his wheelchair (the teacher did not sit with his legs wrapped around the wheelchair), was commanded "Fred, look" and simultaneously the orange ball was moved to one of three eye level positions (straight ahead, to the far right, and far left). Once again, if Fred looked at the ball he was reinforced with a loud "Hooray for Fred" and simultaneous chest stroking. If Fred did not respond in the 3 to 5 second time period, the teacher turned Fred's head to look at the ball and then reinforced him. Again, only 1 command per trial was given with 2 sets of 10 trials conducted, each lasting about 5 minutes with a 3 minute break between sets. The distance of the ball from the teacher was approximately 2 feet. Correct and incorrect responses were recorded.

It is important for the teacher to place the ball in the easiest position for the student to see it. For Fred, this was at eye level. As proficiency increases, move the ball up and down from the student's eye level. The teacher should play with the ball, rubbing it on the student's chest, face, and arms and tossing it up in the air for a 5 minute warmup period.

PHASE 3:

TOUCH THE BALL

For the third phase of the program, the teacher placed the ball by Fred's left hand and commanded, "Fred, touch it." Since Fred's usual hand position is straight vertical and parallel with the torso, the ball was placed at about a 4-inch straight drop from his hand. If Fred moved his hand and touched the ball he was immediately reinforced, if not the teacher slowly took Fred's hand and moved it to touch the ball and rewarded him with a loud "Hooray for Fred" and chest rubbing. Two sets of 10 trials were run with a 5 to 7 minute rest period between the 2 sets of trials. Only one command per trial was given. Correct and incorrect responses were recorded.

Again, it is helpful if the teacher initiates a 5 minute warmup period where the ball is placed on the student's chest and face and also on the student's hand; if possible, the teacher should have the student grasp the ball. On initial trials the teacher should place the ball close to the student's hand;

"Fred, touch it."

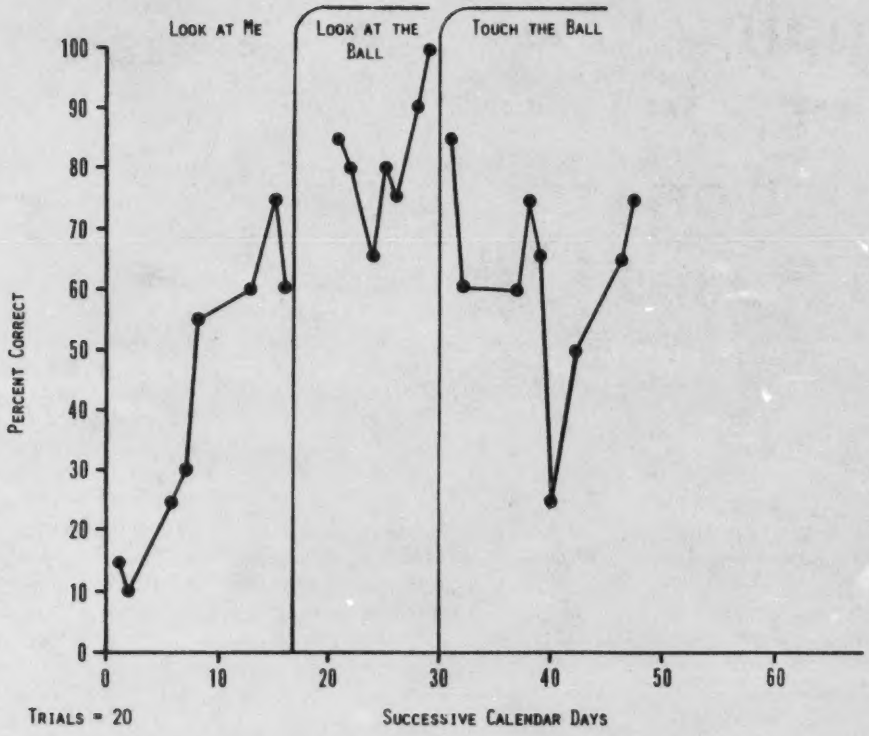

Figure 1. Fred's responses on the three phases of the "look at me" program.

with increasing correct responses, the distance from the student's hand to the ball should be extended. Also, the student must be looking at the ball before the "touch it" command is given.

RESULTS AND DISCUSSION

This study was conducted over a period of approximately 7 weeks. Instruction did not take place on every instructional day due to special classroom activities, Fred's illness, and schedule conflicts. Phase 1, "look at me," showed a growth from 10% correct responses to a high of 75% correct over 8 sessions (Figure 1). The decision to move to phase 2, "look at the ball," was based on Fred's apparent lack of interest. Phase 2 demonstrated good control with responses ranging from 65% to 100% correct (Figure 1). Phase 3, "touch the ball," began immediately after Fred reached 100% correct on "look at the ball." This phase had a range of correct responses from a low of 25% to a high of 80% (Figure 1). The variance in correct responses was due to two major factors. First, Fred's ability to make purposeful hand movements was quite limited. Whereas eye control was a well established behavior, Fred has had very limited experience in purposeful reaching. Hence, the "touch the ball" phase required considerably more effort on Fred's part. Second, the two lowest percentages occurred when Fred was having a considerable number of myoclonic seizures. Obviously, when working with severely/profoundly handicapped children, medical factors such as seizures greatly influence the performance of the children regardless of the effectiveness of specific educational procedures.

Despite Fred's severe handicaps, systematic procedures were effective in establishing stimulus control over three of Fred's responses. When Fred returns to school, the teachers will have a basis on which to begin instruction on more advanced behaviors, perhaps even basic communication responses. At the very least, this study has demonstrated that Fred is capable of learning new behaviors.

SUMMARY

The "look at me" program (all three phases) was initiated as a first step in the process of gaining stimulus control, and also as the beginning of a functional campaign to make simple gestural communication possible for a severely/profoundly handicapped child. The program is simple, cost-effective, and easy to administer in the classroom. The procedures demonstrate the student's ability to learn new responses and the teacher's ability to elicit specific responses from the student. Future programing is possible now that a specific reinforcer has been demonstrated to be effective with this student.

Developing Appropriate Behavior on School Buses

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☐ The utility of behavioral intervention techniques in education is no longer of question. They have been used to manage both social and academic behavior problems with virtually every category of exceptional individuals. Recently the tenets of applied behavior analysis have also been used to change behavior in public settings such as theaters (Burgess, Clark, & Hendee, 1971) and a public campground (Clark, Burgess, & Hendee, 1972).

While educators have bemoaned the difficulties of transporting children to and from school since the inception of the public transportation movement, few attempts have been made to solve behavior problems arising on school buses by means other than disallowing given students to ride the buses. Everett, Haywood, and Meyers (1974) demonstrated the effectiveness of a token economy for increasing the number of riders on a quasi public bus, and Rtisch, Mongrella, and Presbie (1972) showed that "quiet" behavior of a group could be increased on a school bus by reinforcing its occurrence with music. Campbell, Adams, and Ryabik (1974) used a time out procedure (stopping the bus) contingent on any instance of standing, incorrect in seat posture, or fighting by any of the 21 students riding the bus. Frequency and duration of the target behaviors declined to zero or near zero during the treatment conditions. While it might not be possible to use stopping the bus in high traffic environments, it would seem that this general approach should be applicable to that very common concern of educators and parents alike — engendering and maintaining appropriate behavior of students while they ride buses to and from school. In addition to bringing about an increase in safety because the bus driver is allowed to give fuller attention to the act of driving, other benefits might accrue; the development of successful systems for the operant management of behavior which extends beyond the proximity of the teacher in the school would be very desirable. Positive experiences and interactions would increase for students as their inappropriate behavior decreased, and those persons having responsibility for the youngsters — parents, teachers, and bus drivers — undoubtedly would react to them in a more favorable manner.

The following are three examples of simple, successful programs for eliminating inappropriate behavior on school buses.

PROGRAM I

This program was developed in an effort to eliminate (a) out of seat, (b) throwing, and (c) hitting behaviors of youngsters while they rode a school bus to and from school daily. Modification procedures were utilized only in the afternoon during the children's ride home from school on a 40 passenger school bus.

Students

The subjects for this study were 16 special education students ranging in age from 7 to 13 years. They were enrolled in four different classes in two schools in DeKalb County, Atlanta, Georgia. The majority attended self contained classes for youngsters with learning disabilities; the remainder attended classes for the mildly to moderately retarded.

Procedure

Behaviors of concern while the children rode the school bus were defined as follows:

1. Throwing: occurred each time a youngster threw, blew, or projected an object into the air in any way. Event recording was used to determine the operant level of this behavior.
2. Hitting: was defined as raising one's hand in a threatening manner toward another or actually hitting another person. Event recording was used to determine the frequency of this behavior.
3. Out of seat: all behavior other than sitting on the seat with the trunk of the body facing the front of the bus. The "placheck" (Hall, 1971) method of recording was used to measure this behavior, enabling the observer to record the percent of out of seat behavior for the group each day.

After baseline measures were obtained for each of the behaviors, letters explaining the program were sent home to the parents of the children riding the school bus. Both the student and his parents were asked to sign the letter if they wanted to participate; parent participation was in the form of providing backup reinforcement according to their values and commensurate with the behavior change exhibited by their child. Tokens were a smiling face stamped on the back of the child's hand as he exited from the bus if his behavior met criterion at the end of the ride. Criterion, in keeping with the multiple baseline design used, was first no throwing, then no throwing or hitting, and finally no throwing, hitting, or getting out of seat.

Results

During baseline conditions an average of four throwing events and about 14 hitting events occurred each day and, using a plac:eck recording technique, a mean of 49% out of seat behavior was recorded. On the sixth day of the program, when letters were sent to the parents and the children were informed of the initial contingency, no throwing, immediate changes were observed in the behavior being consequated. Reductions in hitting and out of seat behaviors also occurred as soon as the contingency was applied.

Discussion

Sequential reduction of inappropriate behavior was achieved by making the receipt of the happy face stamp contingent on first no throwing, then no throwing and no hitting, then no throwing, no hitting, and no out of seat behavior. Whether similar results would have been obtained by an alteration of the sequence or by requiring simultaneous reductions in all three behaviors is speculative and awaits further research.

PROGRAM II

This program was initiated for the purpose of decreasing the following behaviors exhibited by youngsters while riding school buses to and from school:

1. Failure to buckle seatbelts.
2. Unbuckling seatbelts while riding.
3. Screaming, cursing, name calling.
4. Touching, hitting, or taking things from others.

Students

Subjects for this study were 25 students ranging in age from 5 to 12 years who were attending classes for children with behavioral disorders. They were transported to and from school on minibuses, with eight or nine students riding on each bus. Actual riding time on the buses ranged from about one-half hour to an hour and a half for individual students.

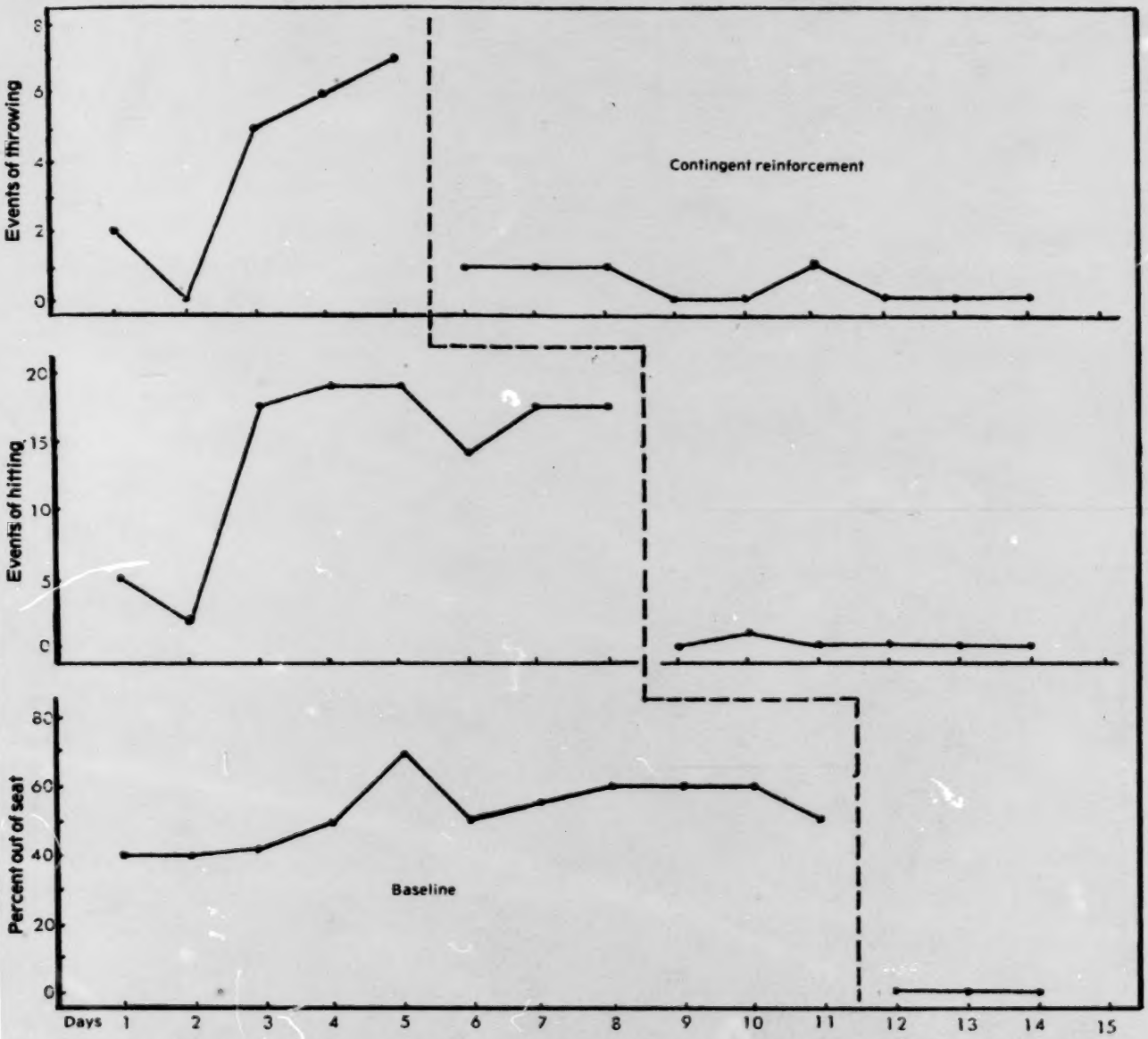
Events of throwing
Contingent reinforcement
Events of hitting
Percent out of seat
Baseline
Days 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

Figure 1. Mean frequencies of hitting and throwing and percent of out of seat behavior across all conditions.

Procedure

Recordings of the number of behaviors for each pupil were collected.

Data were converted to mean number of inappropriate behaviors per day per child while riding the bus, as the investigators were interested in developing a group contingency where a changing criterion could be used to decrease the average number of disruptive behaviors on the buses.

Following the baseiine data collection, a response cost program was established. At the end of each school day, all bus riders were issued a card with two rows of 10 checks depicted on it. These cards were carried on the bus during the ride home and the ride back to school the following morning. During each ride, bus drivers had a clipboard holding tally sheets beside them on which all students' names had been written in bold colored letters to make them easy to identify at a glance. Whenever a student engaged in inappropriate behavior, a tally mark was placed next to his name and the bus driver said, "_____, your seatbelt is unbuckled. I'm putting a mark next to your name." At the end of each ride, the bus driver crossed out one check on the card for each behavior that had been noted for each child as he exited from the bus. As the children entered their classrooms each morning, the teacher recorded the points left on the card from the ride home the day before and the ride to school that morning. Reinforcement was available to the students every Friday on the following basis:

50 checks: see an entertaining film
60 checks: film and popcorn
70 checks: film, popcorn, and soft drink
80 checks: film, popcorn, soft drink, and ice cream

At the end of each week of consequation "prices" were increased by 10 checks, that is, the criterion for reinforcement was raised.

Results

During baseline, the students averaged 6.7 inappropriate behaviors per day, with a range from 5 to 8.3. The first week of consequation, the mean number of disruptive bus behaviors decreased to 3.6 per child per day, with a range from 2.3 to 4.6. During the second and third weeks of consequation, the mean number of disruptive behaviors per child per day decreased to 2.4 and 1.8 respectively, with some variability noted in the third week.

Discussion

Initially high rates of inappropriate bus behavior were reduced appreciably through this procedure. Sequentially reducing allowable levels of inappropriate behavior to receive reinforcement was associated with reductions in the behavior.

PROGRAM III

This program was a sequel to Program II and was carried out the following year. The previous program was cumbersome in its administration due to the attempt to provide data on each student's behavior. The new program utilized a data collection procedure which provided a measure for each bus as a whole. Reinforcement was delivered on a group contingent basis rather than on an individual basis.

The behaviors which the program was designed to decrease on the school buses were:

1. Shouting, name calling, cursing, etc.
2. Putting feet in seats, in aisle, out windows, etc.
3. Hitting, kicking, and pinching others, etc.
4. Throwing objects, shooting rubber bands, etc.
5. Littering the bus or streets or defacing the bus.

Students

The subjects for this study were 39 students ranging in age from 5 to 12 years. The children were attending a

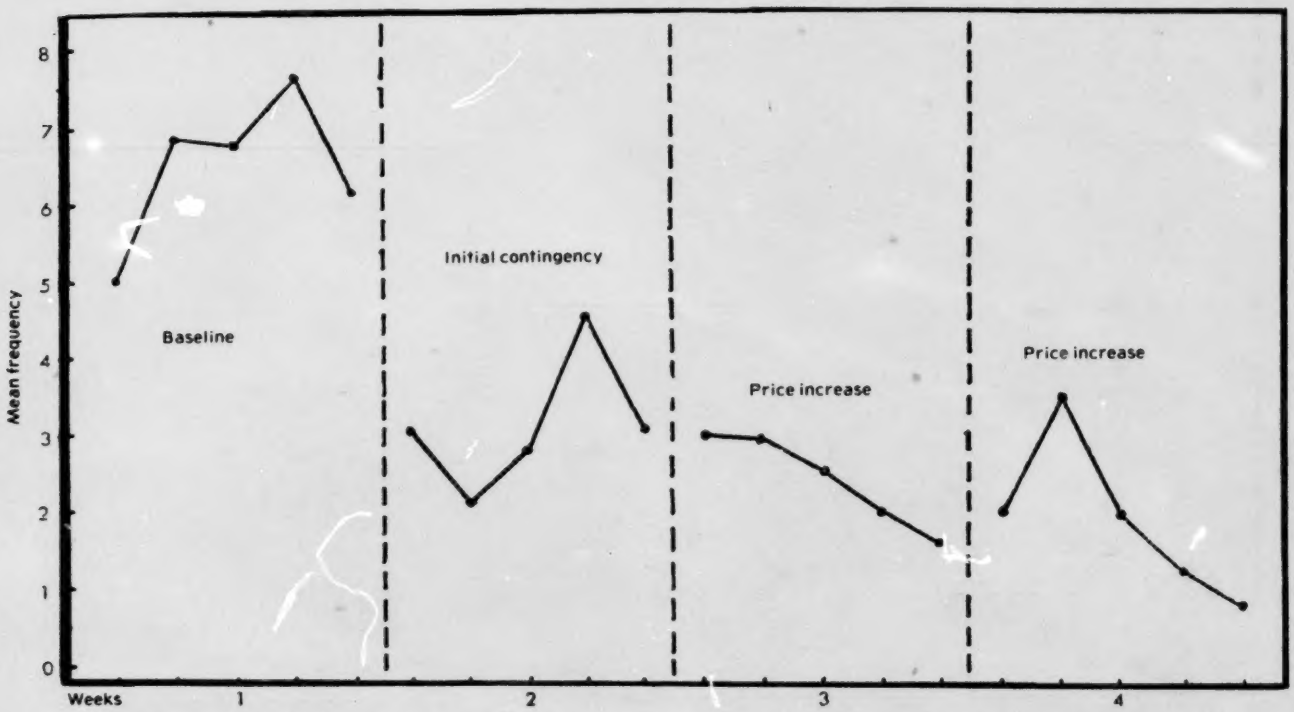

Figure 2. Daily mean number of inappropriate behaviors per pupil across all conditions.

Displaying appropriate behavior on the bus results in positive reinforcement after the ride.

psychoeducational treatment center for students with behavior problems. Transportation was provided by minibuses. At the beginning of the program there were three buses with 12 to 14 children per bus. Toward the end of the program there were four buses with 9 to 10 children per bus.

Procedure

Measurement of the frequency of target behaviors was done by event recording using a hand held mechanical counter. Each instance of a target behavior resulted in a tally on the counter. There was no differentiation among behavior categories in the recording procedure.

A baseline was taken for one week on each of the three original buses. After the baselines were established, a response-cost program was begun. Each bus was initially required to reduce the level of inappropriate bus behavior by 20% in order to receive reinforcement.

Reinforcement was delivered on Friday of each week or the last school day of the week if that was not Friday. The reinforcement consisted of 30 minutes free time in the gym or outside and refreshments. The refreshments consisted of a 5 ounce paper cup filled with a soft drink and a small bag of popcorn. In addition, the bus showing the most improvement over the previous week received a bonus which was usually a bite sized candy bar.

Daily feedback was provided for the students by way of a chart posted in the hallway. This chart had horizontal tracks divided into 20 equal intervals. Each track was assigned to a specific bus and was labeled with that bus number. The chart had a movable finish or criterion line and movable figures, cut from poster paper, to represent the buses. The bus with the most reduction in inappropriate behavior had a jet plane placed in its track and positioned so as to reflect its standing relative to the other buses and the criterion line. The bus with the least reduction was represented by a turtle. The chart was adjusted on a daily basis.

The initial requirement of a 20% reduction in inappropriate bus behavior had to be met for two consecutive weeks and then the criterion was raised by another 20%. This procedure was followed until the terminal criterion of 80% reduction was reached.

Beginning with the sixteenth week of the program, a new bus was put into operation and the students were redistributed over the four buses. It would have been difficult to obtain new baselines and begin over at that point, so each bus was arbitrarily assigned a daily baseline of 20 incidents for purposes of computing reduction of inappropriate behavior. Twenty seemed a reasonable figure in that it was only a little less than the original baselines, and fewer instances of misbehavior were expected since the buses would be less crowded and the ride somewhat shorter for each bus. All four buses were put on the 80% criterion.

Results

During the baseline phase the three buses measured 105, 115, and 130 incidents of inappropriate behavior. These baseline totals have been plotted as single data points which represent the mean number of incidents per day for the baseline week.

Bus 218 (see Figure 3a) reached the criterion of a 20% reduction in misbehavior for two consecutive weeks in the second week of the program. The 40% criterion was reached in the fourth week, the 60% criterion in the seventh week, and the 80% criterion in the thirteenth week. For the entire program, Bus 218 had a daily mean of 4.81 incidents, which represents a mean overall reduction in inappropriate behavior of 81%.

Bus 219 (see Figure 3b) reached the criterion of a 20% reduction in inappropriate bus behavior for two consecutive weeks in the fifth week of the program. The 40% criterion was reached in the twelfth week. This bus was working on the 60% criterion level when the new bus was introduced and the students redistributed. At that time all buses were placed on the 80% criterion. Bus 219 had a daily mean of 12.09 incidents for the full program, which represents a mean reduction in misbehavior of 47% overall.

Bus 229 (see Figure 3c) reached the criterion of a 20% reduction in bus misbehavior for two consecutive weeks in the second week of the study, the 40% criterion in the eighth week, and the 80% criterion in the tenth week. Over the course of the whole program, Bus 229 had a daily mean of 4.86 incidents, which represents a mean overall reduction in inappropriate bus behavior of 77%.

Bus 225 (see Figure 3d) began on the sixteenth week at the 80% criterion level and failed to earn reinforcement only once during the seven weeks that it was part of the program. The mean number of daily incidents of misbehavior for Bus 225 was 1.86.

Discussion

The sequential reduction of the target behaviors in relation to increasingly stringent criterions for reinforcement

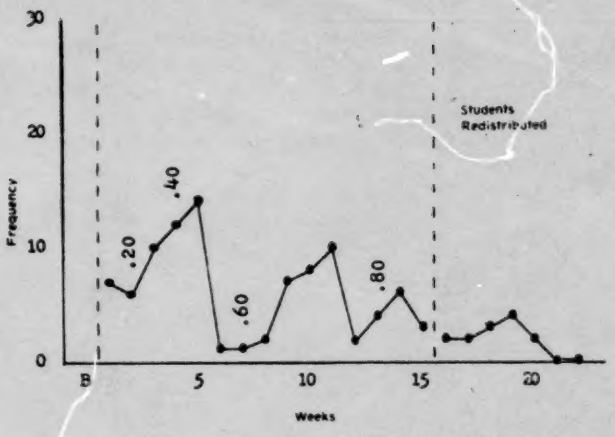

Figure 3a. The mean daily frequency of inappropriate behavior on Bus 218 for 23 weeks, including the baseline week.

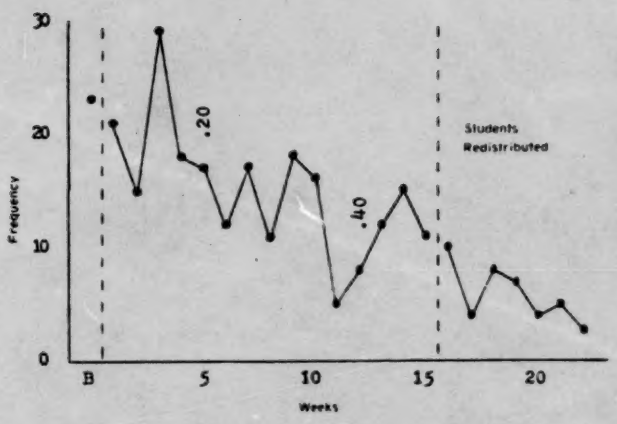

Figure 3b. The mean daily frequency of inappropriate behavior on Bus 219 for 23 weeks, including the baseline week.

suggests a causal relationship between the procedure and the frequency of misbehavior on the school buses. The relationship is most clearly expressed in the data for Buses 218 and 229. Both of these buses adjusted their misbehavior levels in response to the criterion imposed at any given time. Initially, Bus 218 reduced its behavior level more than was necessary to meet the 20% criterion and adjusted it up for the 40% criterion and then back down for the 60% level. Both of these buses probably could have been started on a more stringent criterion than a 20% reduction in misbehavior.

GENERAL DISCUSSION

The three programs were implemented for the purpose of reducing disruptive or inappropriate behaviors of special education students while they were riding school buses. The efficacy of rather simple reinforcement and response cost programs was demonstrated through the use of a multiple baseline design in the first project, and a changing criterion design in the second and third projects.

The programs were inexpensive and easy to implement, although one should be aware of difficulties which may arise when others are relied on to manage behavioral change programs. In one instance it was noted that the bus driver had difficulty refraining from the use of verbal reprimands and threats which could not be carried out. Occasionally, there were circumstances which prevented consequation of behavior, including parents who forgot, lost point cards, special events or activities at school, and illnesses. Despite these possible shortcomings, the behavioral change programs were very effective. Parents, school personnel, and the children were enthusiastic about the bus programs.

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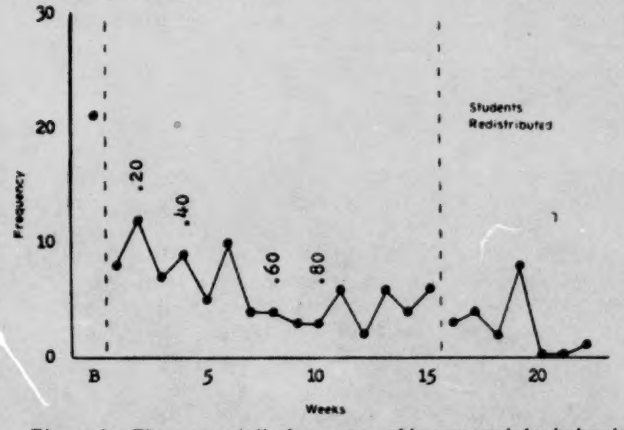


Figure 3c. The mean daily frequency of inappropriate behavior on Bus 229 for 23 weeks, including the baseline week.

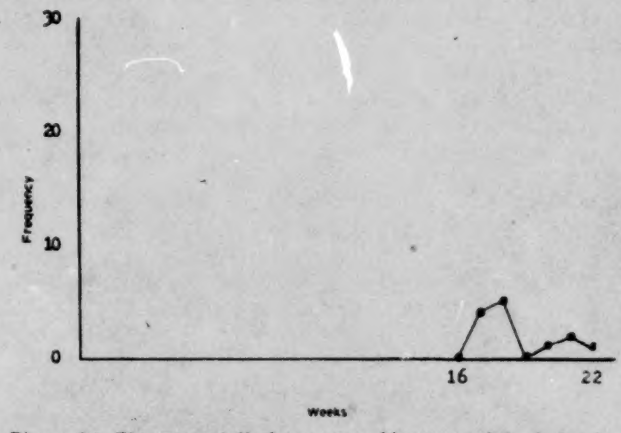
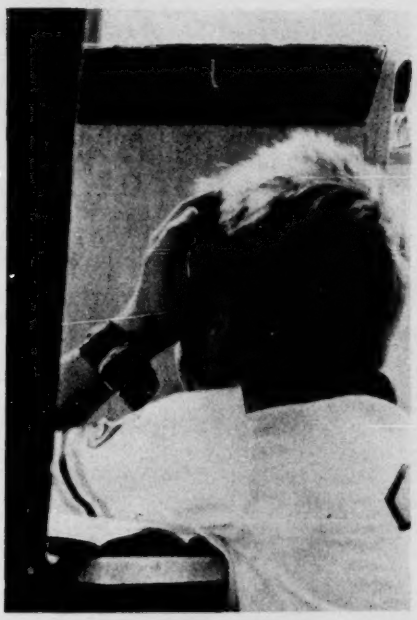


Figure 3d. The mean daily frequency of inappropriate behavior on Bus 225 for 7 weeks. The students on this bus were drawn from the other three buses.

The Autistic Child in the Regular School

MITCHEL A. MILLER

Mitchel A. Miller is a Teacher of Primary Level Emotionally Handicapped Children in the Locust Valley Central School District, Locust Valley, New York.



The autistic child often appears comfortable in his shell.

☐ On my first day as teacher for the primary level emotionally handicapped class I noticed one boy who looked only at his hands, did not talk, and did not move. He was much smaller than the others. There was a glaze in his eyes a deadness. After working in a private school for schizophrenic children for four years, I recognized this boy as autistic.

Steve (as I shall call him) was toilet trained. But his reports indicated he very rarely said anything, did not play with children, ignored adults, resisted instruction, and refused to participate in any activity. Having worked with many "Stevens," I knew the type of program he needed. But how could I work with Steve while teaching my other eight children math, reading, science, and so on? A dilemma? I thought so, until my supervisor suggested I tap an abundant source of manpower, the district high school.

HIGH SCHOOL HELPERS

I contacted the high school guidance counselor, requesting volunteers to work with a "very attractive disturbed boy." Before long he sent me several volunteers, most of whom were interested in special education as a career. After interviewing them, I selected a morning worker and an afternoon worker. They both said they could spend about an hour a day with Steve.

My first step was to explain Steve's problem to the helpers. Autism, I told them, is a condition in which a child is withdrawn and isolated from his environment. He remains in his own world, oblivious to what goes on around him. I told the workers it would be their job to bring him in contact with reality—as much as they possibly could—for as long as they would be working with him. Steve, I explained, was enveloped by a concrete shell separating him from reality. The way to break through this shell—to bring him back into the world—is to bombard him with activities on his level. The more activities he is involved in—the more actual contact he has with the real world—the more we are going to chip away at that shell.

I also explained that it was not enough to just give Steve some clay and say, "Play, Steve." The helper must make a snake out of the clay, and then wrap it around Steve's arm, tickling him, pretending to bite him, going through his hair — making Steve react to the clay and to a human being. And then the helper must put his hand on top of Steve's hand, make Steve roll out a clay snake, have Steve's snake "bite" the helper, and have the helper howl in fake pain. In other words, the helper must impose himself — thrust himself into the activity — playing with Steve, making him react to something. This, I told the helpers, cracks that shell. The more activity we give Steve, the more Steve is going to be in contact with reality.

Naturally, I gave my helpers demonstrations, showing them how to play piggyback with Steve, play monster, roll cars back and forth, look at pictures, sew, draw, and so on. Then I observed the helpers playing with Steve. Usually, there was little to criticize, since teenagers love playing with children. And that is all they really had to do.

I also told the helpers to avoid being manipulated by Steve and to remember that they are always in charge. I explained that autistic children are comfortable in their "shell" and Steve might refuse to engage in an activity. In this case he must be forced to participate. My last important instruction was never to tolerate any inappropriate behavior from Steve. If he should ever kick or spit, he must be grabbed, shouted at, and firmly "plopped" in his seat.

After this "crash course," the program was ready to roll. One volunteer arrived at 9:00. He picked up the day's list of activities from my desk, went behind a bookcase partition in the rear of the room, and started working with Steve. At 1:00 my other helper arrived and did the same.

A Sample of Steve's Weekly Program

	Monday	Tuesday	Wednesday	Thursday	Friday
A.M. Helper	sponge painting	pasting paper	fingerpainting	pasting paper	brush painting
	piggyback rides	flashlight play	peg boards	play wrestling	peg boards
	polishing shoes	language work	doll house	language work	language work
	language work	balloon play	brushing teeth	outside play	pop gun
	bowling	stringing beads	tumbling	slinky on stairs	jumbo blocks
P.M. Helper	toy trains	jumbo blocks	puppet play	toy train	puppet play
	counting	outside play	counting	lego blocks	counting
	blowing bubbles	sewing	sewing	brushing teeth	sewing
	scissors work	records-music	records-music	scissors work	records-music
	block play	coloring book	puzzles	colorforms	bowling

INCLUSION IN CLASS ACTIVITIES

My volunteer program worked well, but since I had helpers for only two hours daily, who would be "cracking the shell" the rest of the day? To contribute to Steve's program, I made myself available to him whenever I could. For instance, when the rest of the class was watching *The Electric Company* or some other television program, I would take Steve to the back of the room and do an activity with him. Or during recess after lunch I would play with, chase, and wrestle with Steve as much as possible. I used my teaching assistant similarly, although she was available for only half a day. Whenever she was not needed to help a student with math or reading, she would work with Steve.

Another technique I used to keep Steve stimulated in activity was to include him with the rest of the class during arts and crafts projects, games, music activities, gym, and cooking periods. Anytime a class activity could be visually, physically, or aurally stimulating, Steve was included. Even during math and reading periods, I helped Steve trace letters or copy numbers with grease crayons. Of course, Steve always went to movies, assemblies, and field trips with the class.

Between my volunteers, my assistant, and myself, we were almost able to fill the day with beneficial activity for Steve. Unfortunately, there were still times when there was no one to work with him and the class activity in progress was unsuitable. During these times I gave Steve a toy which I knew he enjoyed and would use appropriately by himself (like Play-doh or a construction toy).

THE SHELL BEGINS TO CRACK

At first, results came slowly, but they did come. After several weeks, Steve's suspicion of the volunteers disappeared, and he began loving the attention and play he was getting. Some speech developed while he was involved in an activity. After two months, Steve mimicked words the volunteers would "feed" him. By midyear, Steve was labeling pictures and using some short phrases appropriately. Better still, he would watch the door, eagerly awaiting the arrival of his helpers. By spring, he would take the volunteers by the hand, drag them to the back of the room, and tell them, "Sit." Soon he did this to my assistant and myself. By now he sought and demanded my attention — an important step for the autistic child. The shell *was* cracking.

Still more changes came before the end of the school year. When being played with, there were bursts of spontaneous, appropriate expressions. Steve started watching and imitating other children in the class and schoolyard. And before the end of June, Steve was calling me "Mr. Miller."

In September, I was happy to see that Steve, who had spent the summer in a special camp program, had not regressed. Recruiting new volunteer helpers for the new school year, I resumed Steve's program. Almost immediately, Steve began showing surprising changes. He began calling first my assistant by name, and then his helpers, and finally, the other children. Steve then started to bring in toys from home, which he handed to the volunteers as they entered the room. Now Steve plays (albeit on his own level) with other children both in the playground and during "free time" in class. He also shows a desire to join in class activities on his own initiative. He loves imitating me in speech and action. He also enjoys calling me different names (other than my own), and then laughs hysterically, showing a sense of humor. Steve's progress has been dramatic. Everyone in school sees it, and so do his parents.

UNIQUE ADVANTAGES OF THE PROGRAM

Having Steve in my class, is, of course, far better than having him institutionalized. But my program also has advantages over schools specializing in schizophrenic children. For one, Steve gets truly individual attention for at least three hours a day. This attention is aimed only at Steve, and not at the five, six, or seven children usually found in classes at even the best special schools. There is no substitute for a one-to-one relationship when working with an autistic child. This intensive exposure to and reaction with another person is the autistic child's best treatment. I also find that high school volunteers possess a rare enthusiasm and love for children, which is

beneficial to the child who needs enthusiastic play and stimulation more than anything else.

In addition to having this intense attention, Steve also has the advantage of being surrounded by relatively good models — the other children in the class. Now that Steve has some awareness of and plays with the other children, he has appropriate behavior to imitate. While teaching in the school for schizophrenic children, I saw children progress, reach a level of awareness, and then have only the bizarre behavior of their classmates on which to model themselves. But not only do the other children provide good models for Steve, they act as "extra" volunteers. They love him like a baby brother, and even argue over who will play with him. If a child finishes his work early, I allow him to play bubbles or balloons with Steve. In the schoolyard, other children take Steve on the swings or seesaws. Even on the school bus, the children bicker over who will sit next to Steve. All of these instances provide extra beneficial interaction for Steve.

One other immeasurable benefit of my program has been its effect on Steve's parents, particularly his mother. Instead of having her child go to an institution or institution-like school, she sees him going to school with regular children, traveling with regular children, and playing with regular children. This atmosphere, along with Steve's progress, has made the mother noticeably happier. She has also become an active participant in class projects and PTA meetings.

ONE LIMITATION

For all its advantages, my program has one severe limitation: it is applicable to relatively few autistic children. My volunteers, my assistant, and I give Steve "concentrated" blasts of activity and attention. We cannot give the consistency of attention needed to toilet train, extinguish bizarre mannerisms, change grossly inappropriate behavior, or structure the disoriented, disorganized autistic child. The fact is, most autistic children need structured supervision and organization *all* the time they are in school, and even after school. My program is suited for the few children (from my experience, perhaps 10% of the autistic population) who are withdrawn but do not have bizarre mannerisms or grossly inappropriate behavior.

Clearly, most autistic children should not be in a regular school. But those who can, should be. A program for the withdrawn child using the teacher, the teaching assistant, volunteer helpers, and the other children offers the kind of stimulation, attention, and atmosphere that cannot be duplicated in the special school. Special schools and institutions should be combed for those children who could benefit from a program in the regular schools. And those children who could benefit should be so placed.

A Learning Center Quadrant Approach

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□ Two approaches to classroom organization and management that have been popularized in recent years are the learning center approach and contingency managed instruction. Various writers have depicted the use of learning centers in open classrooms, in self contained settings, in resource rooms, and in college courses (Berkman, 1974; Eberle, 1974; Frank, 1974; Nelson, 1974; Volkmor, Langstaff, & Higgins, 1974). It has been suggested that learning centers can encompass the entire curriculum or can provide supplemental learning opportunities for more traditional instruction. Regardless of the particular settings for which it has been suggested, the advantages appear to be constant. A primary advantage is that learning centers can provide individualized instruction requiring active learner involvement. An ancient Chinese proverb, quoted in *Structuring the Classroom for Success* (Volkmor, et al., 1974) underscores the merit of this feature.

I hear . . . and I forget
I see . . . and I remember
I do . . . and I understand

Not only does the role of the pupil change from passive to active, from receiver to doer, but the role of the classroom teacher is also altered. Under this system he can assume the role of instructional manager/tutor in which he designs learning centers, tailors learning activities within the centers to meet individual needs, writes student programs, and monitors student progress. More of his instructional development time can be spent creatively in that the very nature of the learning centers (individual or very small group involvement) negates the need for producing large numbers of duplicate materials. For the same reasons, the individual or small group instructional delivery format permits better utilization of the classroom materials budget.

CLASSROOM MANAGEMENT

Learning centers as a method of instruction introduce the student to a school environment that requires a minimal level of teacher supervision, immediate teacher reinforcement, and independence from peer interaction. These are classroom variables which many exceptional children and teachers are quite familiar with. The method, learning centers, needs a facilitative delivery system. Contingency management has been implemented effectively across a wide variety of classroom settings (Buckley & Walker, 1970; Neisworth & Smith, 1973; Worell & Nelson, 1974) and there appears to be rather conclusive evidence to indicate its usefulness in improving student motivation, accelerating on task or attending skills, facilitating individualized instruction, and heightening pupil achievement (Thompson, Brassell, Persons, & Tucker, 1974).

The use of contingency management in a learning center approach has been documented by Volkmor and colleagues (1974) in shaping pupil acceptance of the centers. Beckman (1974) utilized a token economy within a learning center program for adolescent educable pupils. The use of pupil performance areas as suggested by Homme's (1970) physical division of the Task Area from the Reinforcing Event Area is suggestive of the learning center approach.

The classroom project reported below incorporated learning centers and contingency management procedures in a quadrant design (see Figure 1) within a classroom setting for trainable adolescents. The quadrant design permitted four levels of teacher/pupil interaction to occur simultaneously, while increasing the degree of pupil independence from direct supervision and teacher stimulus control. Contingency Management Instruction procedures, token economy, and pupil contracting were utilized to facilitate student participation in the learning centers as well as to provide the teacher with a data system to monitor daily and weekly pupil activities within the classroom. The Contingency Management Instruction techniques selected for use in the classroom were ones believed to best simulate the management systems the

Figure 1. The quadrant design of the classroom.

pupils would confront in their activities out of school and in potential vocational settings. The learning centers themselves were designed to facilitate higher and higher levels of independent functioning in these daily living and vocational skill areas.

PROJECT SETTING

The learning center quadrant approach was instituted with older adolescent developmentally retarded pupils enrolled in a special school for the trainable mentally retarded in a metropolitan area. The six boys and four girls ranged in age from 17 to 20 and had scored from 36 to 61 (mean 49) on individual intelligence tests. The staff evaluation of pupil functioning had determined that training for competitive employment and independent living was not appropriate for these pupils. Consequently, the curriculum of the class was geared toward eventual sheltered workshop employment and sheltered adult living. The general objectives of the class are given below.

CLASSROOM OPERATION

Four learning centers evolved as a function of the stated classroom objectives, with approximately one-fourth of the physical space of the classroom being devoted to each. These activity areas came to be known as (a) the academic quadrant, (b) the home skills quadrant, (c) the workshop quadrant, and (d) the reinforcing event (RE) quadrant. Each day two to four tasks were provided in each task quadrant, with a broad range of activities existing in the RE quadrant.

General Objectives of the Class

I. Each student will demonstrate competency in the 20 basic home skills for the developmentally retarded.

1. Make simple foods and prepare basic meal.
2. Use kitchen utensils (Vegetable peeler, knife, spatula).
3. Open ice trays.
4. Set table.
5. Wash dishes.
6. Empty trash.
7. Clean sinks and other fixtures.
8. Sweep with broom.
9. Use vacuum cleaner.
10. Dust furniture.
11. Make bed.
12. Use washer and dryer.
13. Fold and hang clothing.
14. Sew on button.
15. Iron clothing.
16. Polish shoes.
17. Use telephone.
18. Feed pets.
19. Water plants.
20. Set alarm clock.

II. Each student will demonstrate competency in 12 basic job attitudes necessary for workshop employment.

1. Be on time.
2. Do not waste time.
3. Do the assigned job.
4. Go on to the next job when finished.
5. Get along with other workers.
6. Face work (orient toward work).
7. Follow directions.
8. Do a good job.
9. Be careful with the job.
10. Take care of the tools and the job parts.
11. Use tools and job parts appropriately.
12. Stay on task.

III. Each student will demonstrate competency on those academic skills deemed necessary and prerequisite for sheltered employment and living (e.g., math skills related to use of the time clock).

IV. Each student will demonstrate social behaviors that are acceptable for workshop employment.

1. Act like an adult.
2. Use free time (work breaks) appropriately.
3. Wait in line appropriately.
4. Ride bus and travel independently.
5. Function well as a member of a group, as well as independently.
6. Demonstrate self direction in use of time.

V. Each student will demonstrate the ability to stay on task for extended periods of time.

VI. Each student will utilize free time in a constructive manner, engaging in activities of his own choosing.

New tasks were continually being designed and rotated into the task areas.

At the beginning of school day, each student would draw his work schedule ticket from the classroom schedule box. The ticket would specify the initial quadrant to which the student was assigned as well as the specific task in the quadrant that the student was to complete. The ticket also included the individual task assignments for each of the other quadrant areas, although the students had the option of deciding the order in which they entered the two remaining quadrants. No more than four students were permitted in a single quadrant at a time and color coded clothes pins, which the students removed on entering a quadrant and replaced when leaving, indicated the availability of pupil spaces in that area.

The teacher and a paraprofessional circulated among the students, making progress checks, providing individual assistance, evaluating completed tasks, and validating student coupon books for acceptable task completion. At all times during quadrant activities the students were encouraged or reinforced (verbally) for self directive behaviors. A major objective of this procedure was to accelerate the rate of self initiatory types of behaviors in the students' total repertoire of responses in both task activities as well as the RE and social activities. Particular attention was paid to students demonstrating these various types of self initiatory behaviors through use of them as recommended peer models and by exhibiting products of their work. In essence, a fairly normal competitive environment was approximated for a vocational setting such as a sheltered workshop. Students could spend their validated coupons in a variety of ways. They could spend them for admission to the RE quadrant, either intermittently during the day or during the last 30 minutes of the day when the RE quadrant was open to everyone. Students also could save coupons to spend at the weekly store at which high preference commodities such as comic books, records, beauty items, and special event tickets could be purchased. If a student completed all of his assigned tasks, and did not wish to spend coupons in the RE quadrant, he had the option of cycling back through the task quadrants for additional tasks which could earn him additional coupons.

PROBLEMS IN IMPLEMENTATION

Several problems were encountered in implementing the learning center quadrant

The kitchen is an inviting place to develop group cooperation and prevocational skills.

approach. A major one was the number of out of class activities (music, gym, speech, special activities programs) which fragmented the daily schedule. Quadrant tasks were designed for completion within a 15 to 20 minute time period to facilitate the flow from quadrant to out of class activities, most of which took place on a quarter-hour or half-hour schedule. Nonetheless, students were frequently scheduled to leave a task quadrant before they had completed the assignment. Scheduling arrangements designed to provide this classroom with longer periods of unbroken time hopefully will alleviate some of these problems.

The students initially encountered difficulty adjusting to a self pacing program such as this that required decision making on their part. A great deal of teacher counseling and direction was needed during the first few months in moving students from quadrant to quadrant and in guiding them in spending their coupons. Students had to be taught that if they did not complete a task, they did not get their coupons validated and did not get to move to other quadrants. Further, they had to learn that if they spent their coupons early, they did not have any to spend later. These kinds of management considerations interfered with the amount of time the teacher had to work individually with students and affected the design of the individualized instructional tasks. The use of university practica students as aides in monitoring students' progress and for designing instructional tasks alleviated these problems to some extent. However, the significant problems of teacher and staff having time for attending to students exhibiting problems cannot be overlooked and is similar to the problems documented elsewhere (Blackhurst, 1974) concerning the problems of operating a competency based or performance based training endeavor. The more competent students were facilitated by the opportunity to set their own pace or rate of activity and reap the benefits of that effort. The less capable students, at least initially, needed a great deal of individualized programing to maintain a viable level of productivity.

CONCLUDING STATEMENT

The learning center quadrant approach has been in operation for less than one academic year. While actual data on pupil progress in the various preacademic, academic, prevocational, and vocational skill areas are still too incomplete to make statements concerning the effectiveness of the approach in these areas, the impact of the system is more evident in social and interpersonal behavior areas. The students are responding to the approach with obvious enthusiasm and exhibiting a much lower rate of inappropriate classroom behavior. Definite progress has been noted in basic self help skills areas of grooming, dressing, and general appearance. Significant progress has been evidenced in prevocational skills such as working cooperatively in group settings, staying on task, following instructions, and reporting for work on time. The initial difficulties with expenditure of earned coupons have been eliminated for the most part, requiring only minimal counseling concerning appropriate expenditure of earnings.

Additional performance data will be sought for all aspects of the classroom. It is believed that combining this approach with one similar to the skills center module discussed by Jordan (1973) would provide the trainable mentally handicapped student with a systematic continuum of education and training which would increase the overall effectiveness of the public school endeavor.

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Teaching the Profoundly Handicapped in the Public School Setting

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□ Until recently the responsibility for the profoundly handicapped has been borne primarily by medical and social service personnel. Educators have neglected their role in providing the education that these children require to progress toward self care and independence.

As a result of recent legislation and litigation (e.g., Mills vs. Board of Education of the District of Columbia, 1972) public school personnel are required to provide education for the profoundly handicapped. In order to handle this responsibility classes for the profoundly handicapped are being organized, teachers are being trained, and appropriate curricula are being developed. There is a nationwide trend to remove these individuals from the custodial, vegetative existence that has been their lifestyle to one of awareness and involvement. In short, the educational potential of the profoundly handicapped is being recognized.

The purpose here is to provide teachers with some basic considerations of instruction. These considerations have been derived from the authors' experiences of working directly with the profoundly handicapped as well as from many hours of conversation with personnel involved in the care of such children.

CONSIDERATION #1

Get the profoundly handicapped child physically relaxed before beginning a training sequence.

Experience has shown that many profoundly handicapped children become physically rigid or tense when placed in a new situation or with unfamiliar people. In this state of excitation the child is unable to focus his attention on the task to be learned.

In order to relax the child, the environment should be, as much as possible, devoid of distracting stimuli. Distractors such as an excess of materials within the child's visual range or the occurrence of any sudden movements or loud noises should be reduced to a minimum.

To relax the child, rapport can be gained by being friendly and calmly talking to the child. Rocking him in the fetal position gently can relax the muscles of a small child. Hydrotherapy (placing the child in warm, circulating water) and gently rubbing and/or tapping the opposing muscles of the contracted body parts can be used for larger as well as smaller children. In addition, soothing stimulation such as quiet background music can be employed to help filter out auditory distractions and maintain a calming atmosphere.

If the child is calm and relaxed, he is more likely to be able to focus on the learning task than if he is tense and rigid with his muscles contracted. (It should be noted that a few children's muscles are flaccid rather than tense and rigid. Activities such as placing them in a tight, flexed, ball-like position can help.)

CONSIDERATION #2

The profoundly handicapped child should be properly positioned for good body alignment and optimal visual range and movement.

Due to the extreme mental and physical handicapping conditions of the profoundly handicapped, they are frequently put into cribs or beds for a considerable part of each day. At other times they may be placed in wheelchairs to enhance their mobility. Unfortunately, they are sometimes *not properly positioned.* As a result, many of these children develop physical deformities and have a restricted visual range.

Such accommodations can give the profoundly handicapped child a distorted view of his environment. While in a reclining position on an all day basis the bulk of visual stimuli available includes only ceilings and upper body portions of other individuals. In standard wheelchairs, lacking adaptive equipment for positioning, the child frequently does not have the head and trunk control to sit up straight so his visual range is limited to the floor space in the area around the wheelchair and the legs and feet of others. In short, anyone subjected visually to *only* ceilings, floors, and isolated body parts will develop a distorted perception of their environment.

In addition, extended or improper use of cribs and standard wheelchairs can be physically debilitating. Profoundly handicapped children generally have poor control of body parts. When placed in cribs for extended periods of time they generally lack the ability to keep their limbs positioned for proper growth. Also, exercise to develop the muscles is not facilitated. The result may involve twisted, deformed limbs having little or no muscular development and poor body functioning such as circulation, digestion, and respiration. Similarly the sling seats and backs of some

Proper positioning is crucial to the development of self help skills.

standard wheelchairs do not provide the support needed to develop appropriate body alignment, functioning, and growth. Without proper support in the sitting position some children will tend to sit with back and shoulders rounded. Extended periods of sitting in such a position can cause trunk problems, scoliosis, and deformities of the trunk and extremities.

Such factors make the importance of proper positioning obvious. For one thing, the child should never be left in a reclining position throughout the day. During those times when he is placed in a reclining position, pillows and bolsters can be used to foster proper body alignment. Frequent repositioning (e.g., turning the child from prone to supine or on his side) can help prevent deformities and assist circulation and digestion. In addition, adapted chairs to meet each child's needs should be available when needed. The adapted chair should provide support to the back and buttocks. If necessary, seat wedges and belts in the adapted chair can be used to keep the child's back straight and aid in reducing abnormal reflexes such as the extensor thrust reflex (uncontrolled straightening of the arms, legs, head, and back on stimulation or excitement). Stabilizers to reduce involuntary movements of the arms and feet, neck pillows to keep the head in alignment, as well as footrests, braces, and laptrays should be options available to the child. The use of such chairs improves the visual range and body functioning (circulation, digestion, etc.) of the child and reduces the opportunity for deformities to develop. It also places the child in the best position to use his limbs to engage in training.

It should be noted that an adapted chair is a prescription item and requires proper fitting by a qualified individual. However the teacher can be aware of the individual needs of the child and note these to the prescribing individual so the child can receive the chair that most appropriately enhances his abilities.

A word of caution should be included here. A child's muscle growth and movement potential can be stifled if he is strapped or otherwise held in a particular position improperly or beyond the point absolutely needed. At certain points in time children need freedom to move in order to develop properly. Therefore, while firmly positioning, with straps or by other means, children lacking the ability to sit up without support is beneficial in many cases, there are inherent dangers that must be avoided. As noted earlier, the teacher should consult a qualified individual (usually a physical or occupational therapist).

Adapted chairs should be gradually introduced to the child. Initially the child should be positioned in the chair for several 15-30 minute intervals until he can spend 3-6 hours per day in the chair. The child should not be placed in the chair for prolonged periods of time or on an all day basis since contractures or other problems may develop. Portions of every day should be spent out of the chair on a firm surface such as the floor. This also provides an opportunity for the teacher to examine the child for evidence of pressure areas (manifested by inflammation, sores, bruises, etc.) that may indicate needed changes in the adapted chair. It should be noted that proper positioning on the floor is important also. Finnie (1975) is an ex-

cellent source of suggestions regarding this.

Proper positioning is essential to promoting optimal growth and capitalizing on the learning potential of the profoundly handicapped child. In addition, lifting and carrying nonambulatory children with proper body alignment firmly in mind is important. There are ways when carrying a child to offset his or her tendency to improperly position a limb of other body parts. Finnie (1975) is also a good source of information regarding lifting and carrying.

CONSIDERATION #3

Get the profoundly handicapped child actively involved.

A characteristic of the profoundly handicapped population is their initial need for dependent care. When the young profoundly handicapped child enters school he generally does not possess the capability of independently caring for his basic needs. Another characteristic of profoundly handicapped children is their need for passive exercises (requiring no behavior of the child). Many of these children simply lack the ability to actively move their body parts.

Dependent care enables the child to get his basic biological needs (ingestion of food, warmth, cleaning of dirt and bacteria from the body, etc.) met when he is unable to handle them himself. Passive exercises directly communicate to the child what body parts he has, where his body parts are, and the possible movements that can be made by each body part. Such knowledge provides the child with direction for exploration. Therefore dependent care and passive exercises are important and necessary approaches when initially working with the profoundly handicapped.

However, these two fundamental factors are frequently inappropriately perceived. The need for dependent care and passive exercises are often perceived as the primary and only guidelines for dealing with profoundly handicapped children. As a result adults tend to fall into the "trap" of doing everything for the child rather than allowing him to do whatever he can for himself.

Short and long range goals for training this population should focus on what the child *can do himself.* Even if the goal is only to have the child turn his head toward the food source during feeding time, the child should be actively involved to the utmost extent he is capable. This active involvement is imperative for developing and strengthening the muscles and integrating the thought processes to enable the child to understand how to perform activities on his own. Unless the child becomes actively involved in performing behaviors to get his needs met, he will probably never develop the full understanding, strength, or motivation to care independently for his own needs. In short, the teacher should remember that while it is necessary to assist the child to complete certain responses, the teacher should gradually withdraw (fade) his efforts. In many instances, the teacher should work backwards from the end of the sequence, that is, try to get the child to do the last step after the teacher has done the rest. Next, get the child to do the next to last step. In this way he is always working into a step that he can already do. This provides reinforcement for the preceding step and occasions the next one.

It should be noted that involvement of profoundly handicapped children in an activity must be systematically programed and is generally slow in being realized. It is often easier and quicker to perform the needed movements for the child. However without being patient and allowing the profoundly handicapped child to do for himself whatever small bit he can, he may never achieve any degree of independence.

In many cases the child may be capable of progressing in certain areas, yet inability in another area may hold him back. For example, a child may be able to eat independently by finger feeding and sucking liquid through a straw, but not have the control necessary to hold the drinking cup. In such cases prosthetic devices can be used to enhance the child's active involvement and independence. With the use of an elevated cup holder the child in the example above may be able to complete a meal independent of an attending adult.

Prosthetic aids can and should be used to enhance active involvement and independence. Such aids are available for nearly every aspect of independent functioning the child might be engaged in during the day.

CONSIDERATION #4

Continue to talk to the profoundly handicapped child.

The profoundly handicapped child should receive a great deal of meaningful language stimulation that is highly repetitious. For this reason every available opportunity to talk to the child should be systematically employed to enable him to gain some degree of receptive and expressive language. Interactions during training sequences provide this opportunity.

To effectively utilize this opportunity several points should be considered. During training the teacher should position himself on the same visual plane as the child. (If the child is on a mat or the floor, the teacher should be down with him.) In talking to the child whenever possible the teacher's face should be directly in front of the child's and in close proximity. In this way the child can see facial gestures and lip movements. The profoundly handicapped child can learn to associate certain facial expressions to the meaning they convey. In addition the child can recognize the fact that verbalizations come from the lips and mouth region. Also by being on the same visual plane as the child, eye contact can be made and used to aid the child in focusing his attention.

When talking to the profoundly handicapped child, keep all sentences short, concise, simple, and to the point. In this way key words can be recognized and understood. Complex sentences are generally too long to attend to and the relationships of the words to one another are too difficult for the profoundly handicapped child to grasp. Limit the use of pronouns (this, that, etc.) since they do not of themselves convey meaning. The abstraction of pronouns may confuse the child since they do not provide a consistent label of a single item.

When giving verbal directions to the profoundly handicapped child, repeat them several times. Also use the same words each time the direction is given. If different words are used the child may have difficulty grasping the changes. In the example, "Give teacher spoon"/"Give me spoon," the switch from *teacher* to *me* may be confusing. Of course, after the child acquires some rudimentary vocabulary, the teacher will want to expand systematically and use as many different words as each child can comprehend.

An excellent opportunity to teach labels and activities is during dependent care and training sequences. During a feeding sequence the teacher should label the foods and activities, such as "Billy is eating potatoes," as he assists the child in guiding the spoon with potatoes to his mouth; substitute names of other foods as they are available. For teaching body parts bathing provides an excellent opportunity to communicate. While bathing

say, "Let's wash Billy's ears," "Let's wash Billy's hair," etcetera, as you guide his hand with the washcloth to various body parts. (It should be remembered that bathing may be a part of the school curriculum for the profoundly handicapped as may be the teaching of sensory awareness, sucking, chewing, swallowing, toileting, language acquisition, etc.). Such talking while working with the child provides the opportunity for him to develop a receptive vocabulary and subsequently provides the basis for an expressive one. It should be noted that talking is highly reinforcing to many children. Therefore, the timing should be also considered when the teacher talks.

When the young profoundly handicapped child explores his ability to produce vocalizations (cooing, gurgling, babbling, speech sounds, etc.) he should receive verbal response. In this way he can recognize that his verbal noises are useful and do communicate. Responses to his sounds provide motivation for him to keep trying to vocalize for attention.

Often the importance of verbalizations directed toward the child is overlooked if the child is diagnosed as being deaf. However verbalizations directed toward such a child should continue for several reasons. First it is extremely difficult in many cases to correctly diagnose deafness in a profoundly handicapped child since mental or physical problems may be the cause of his not responding to sounds rather than his lack of ability to hear the sounds. Also most children with auditory handicaps possess some residual hearing that can allow input to be processed when spoken to individually without ancillary auditory distractions or at certain sound levels. Even if a child is totally deaf he may learn to recognize lip and facial movements and expressions that can enhance communication.

Talking to the profoundly handicapped child contributes considerably to enhancing his language system, a major component of learning and social interaction.

FINAL NOTES

Recognition of the educational potential of the profoundly handicapped is becoming widespread. There is a nationwide trend to remove these individuals from the custodial, vegetative existence that has been their lifestyle to one of awareness and involvement in daily living.

Self contained public school classes are being established with about a 1:5 teacher/pupil ratio (Stainback, et al., 1976). Teachers will find themselves teaching sensory awareness, head and trunk balance, eating, bathing, ambulation, toileting, dressing, language acquisition, etcetera. They also might find it necessary to reduce or eliminate inappropriate behaviors such as head banging, finger chewing, and feces throwing.

To function effectively in such classrooms, it will be imperative that

Facial expressions play a meaningful role in language stimulation.

classroom teachers critically evaluate considerations such as those discussed in this article. Time and space do not permit a full discussion of numerous other topics that must also be considered. However, because of the practical importance of some of these topics, the final notes section briefly outlines a few additional considerations. It is hoped that this skeletal outline might provide an impetus for a more thorough and full discussion of these topics among classroom teachers.

Landmarks of human growth and development are among the necessary considerations for teachers of the profoundly handicapped. A working knowledge of infant and early childhood levels of functioning is essential for evaluating the functioning level of each child as well as establishing a viable, effective curriculum. The reason for this is that the primary goal of education for the profoundly handicapped is to move them to higher levels of functioning in the human growth and development sequence.

We must also consider the necessity of taking time to have fun. Celebrate birthdays, holidays (July 4th, St. Patrick's Day, etc.) and schedule picnics and parties. Educating these children can be an enjoyable and pleasant experience. In addition, such activities can provide excellent learning experiences for the profoundly handicapped.

Another consideration is to become physically involved with the profoundly handicapped child. Generally these children can benefit from properly handled movement or manipulation. Regardless of physical deformities or twisted limbs the teacher should touch, hug, roll, and tumble with the child. Do not fear the child. (However, you must be aware of physical problems that may prevent some types of physical activity.) Enjoyable physical play and manipulation can foster the child's muscular development and sensory awareness. Also becoming physically involved with the child helps establish rapport with him. He learns about you and you about him. It should be noted that during physical activities the teacher should be aware of the child's facial expressions, vocalizations, and body movements that may indicate manipulation that is painful or unpleasant to the child. One specific indication of this is when the corners of the child's mouth turn down. Generally, physical play can aid the child's development as well as the teacher's awareness of the child's abilities when safety measures and medical considerations are taken into account.

In addition the teacher must be familiar with any medications the child is receiving and their effect on his behavior. The child's activity level and his ability to carry out a particular task sequence may be affected by the administration of certain drugs. For example, on one day the child may be capable of performing the complex task of self feeding with a spoon, while on another the ingestion of medication may limit his attention and eye-hand coordination to the point that spoon feeding is extremely difficult, if not impossible. The teacher must be aware of such aspects to plan effectively for the curricular needs of a child on a particular day or time period. If the medication factor is not considered, involvement in a particular training sequence may result in frustration for both the child and the teacher.

The teacher should also consider the fact that research (Bensberg, 1965) has shown that profoundly handicapped children learn best when reinforcement contingencies are planned and the task to be learned is behaviorally stated, task analyzed, and logically sequenced. Not only is the probability of response acquisition enhanced but it also permits more precise measurement and evaluation. This is important since progress with profoundly handicapped children is sometimes slight and tediously slow.

Finally, be optimistic in evaluating the potential of profoundly handicapped children. Often due to the lack of response from these children and the appearance of their sometimes twisted bodies and limbs we tend to underestimate their potential. Continually seek areas in which the profoundly handicapped child can succeed and capitalize on them.

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